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(54) **SOLUBLE CORE FOR HIGH-PRESSURE
CASTING AND MANUFACTURING METHOD
THEREOF**

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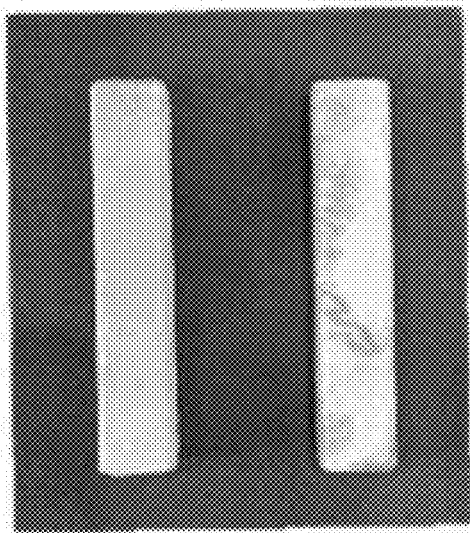
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ABSTRACT

According to the method for manufacturing a soluble core for high pressure casting, the method for manufacturing a core by dispersing a heat-resistant hard ceramic powder in a water-soluble chemical salt having a melting point 140° C. to 260° C. lower than a melting point of a cast metal and a heat capacity of 90 J/(mol·K) or more is a very useful technology that can easily manufacture a core for high pressure casting of metals such as aluminum and magnesium, and a method for extracting a core from casting can also be simply performed by heating and extracting the core at a temperature equal to or lower than the melting point of the cast metal, and since the core material can be recycled, it is very advantageous in terms of productivity and economy.



(SHAPE OF CORE)

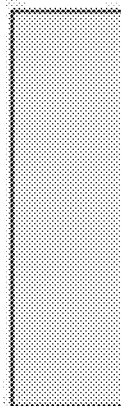


FIG.1

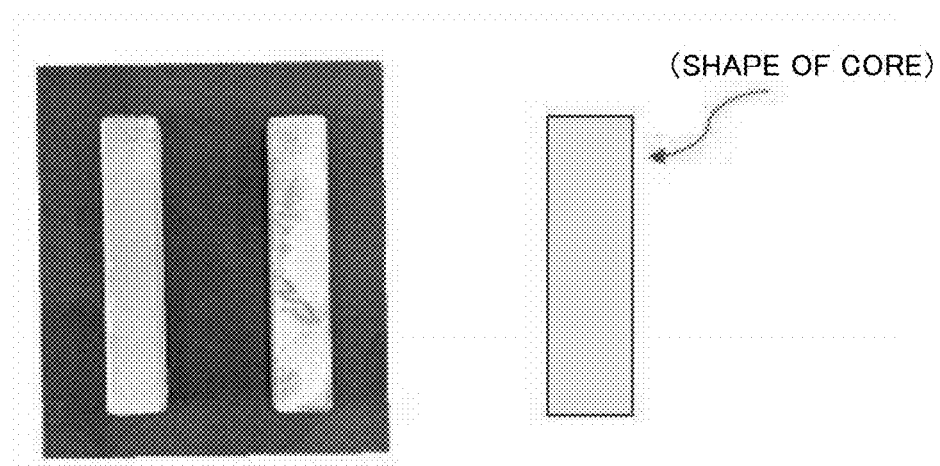


FIG.2

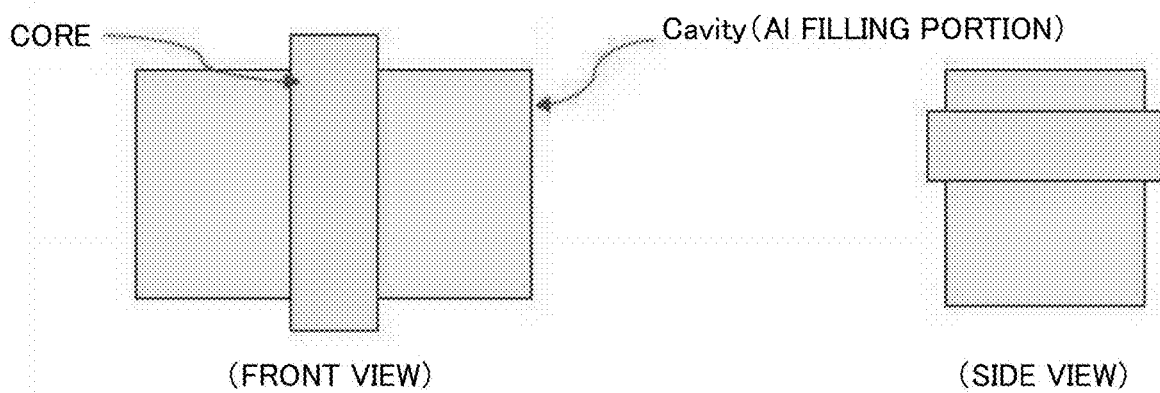


FIG.3

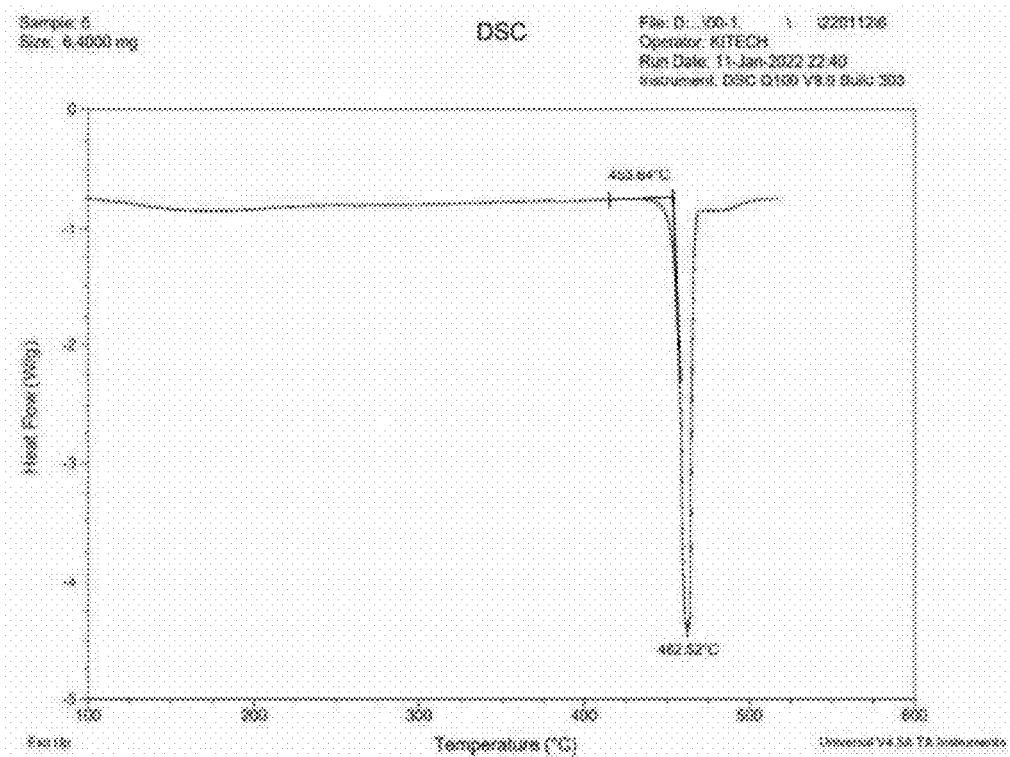


FIG.4

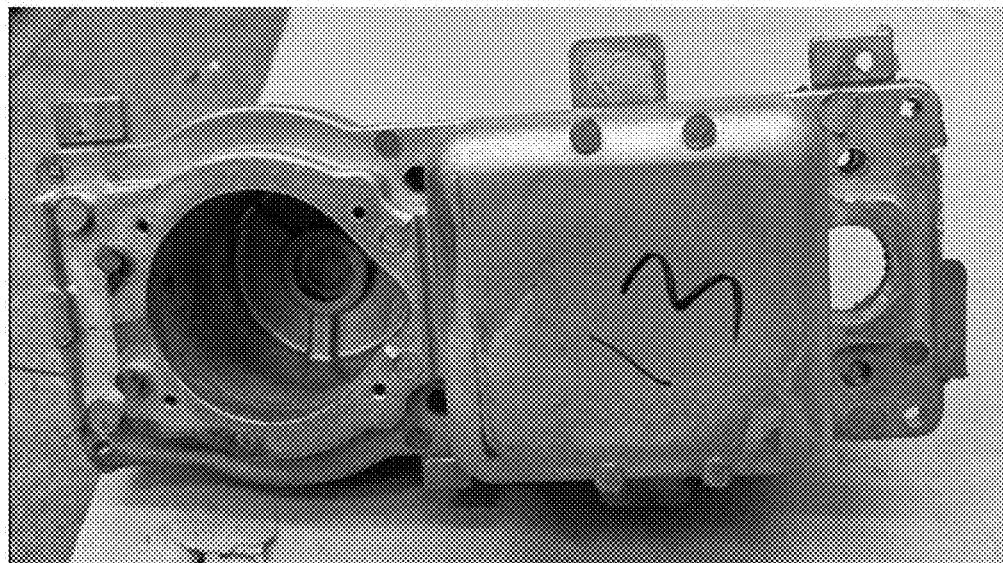


FIG.5

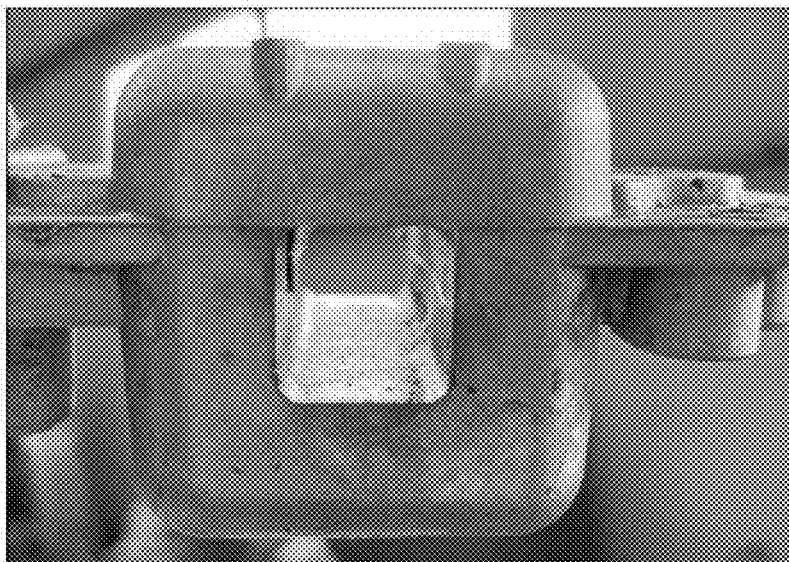


FIG.6

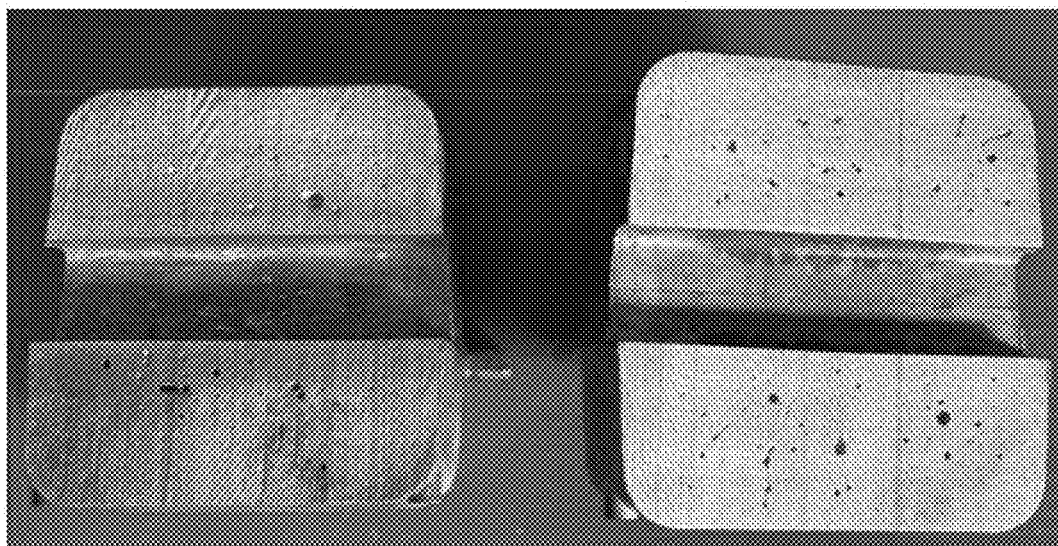


FIG.7

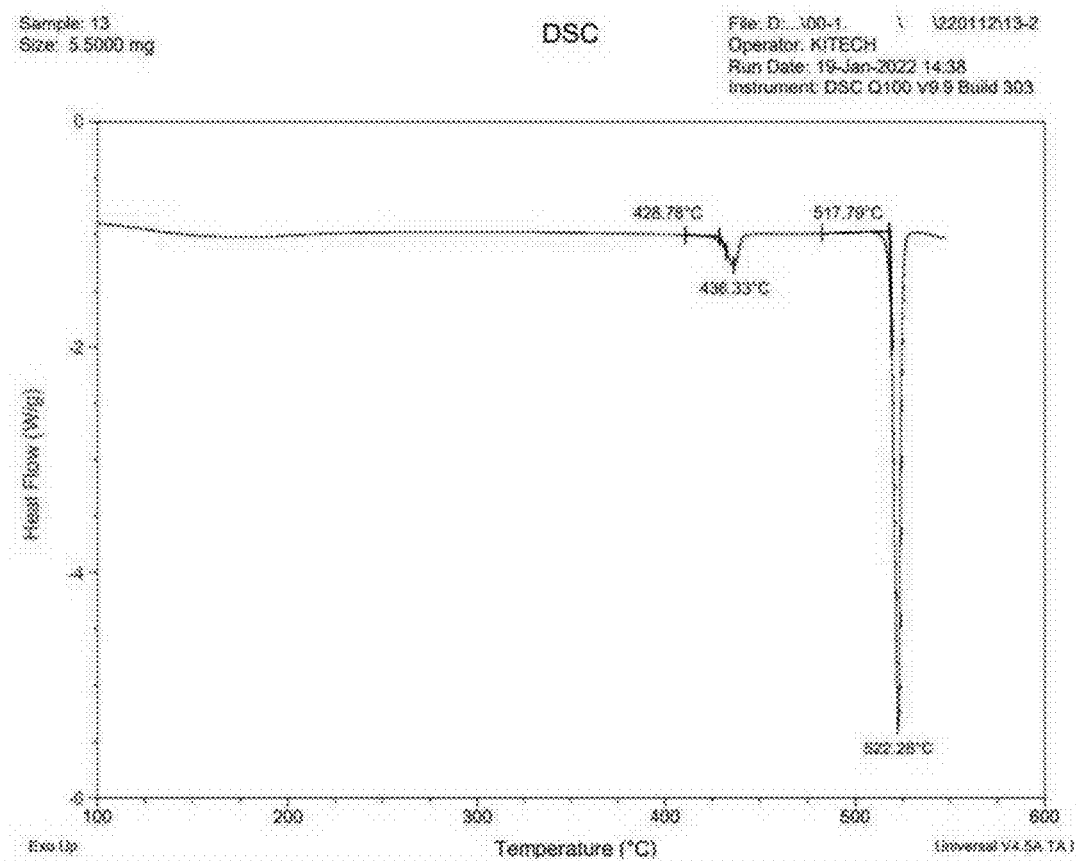
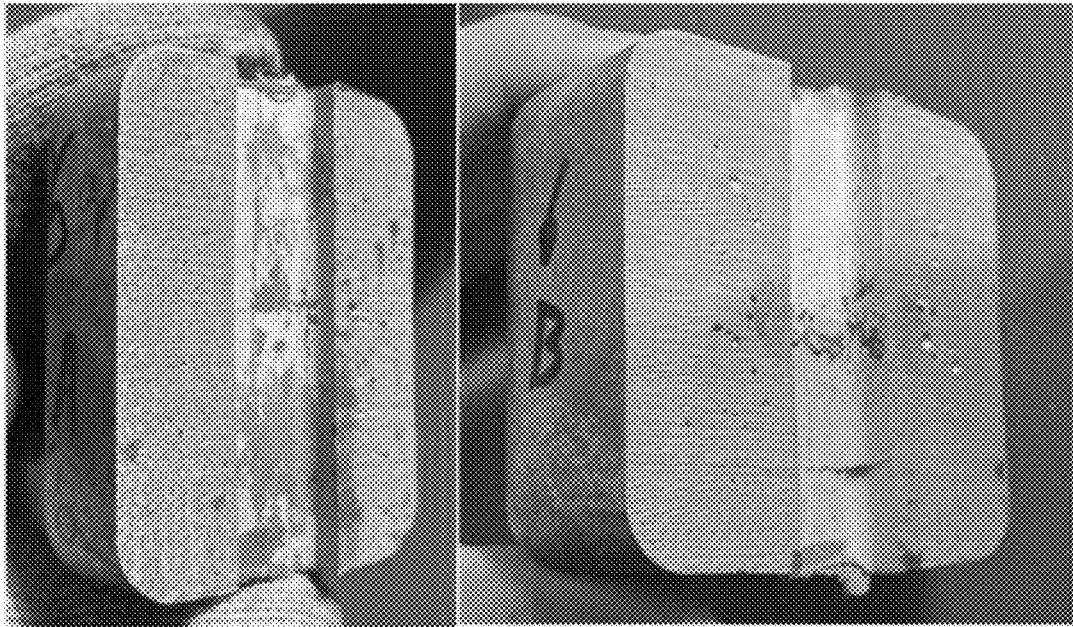


FIG.8



SOLUBLE CORE FOR HIGH-PRESSURE CASTING AND MANUFACTURING METHOD THEREOF

TECHNICAL FIELD

[0001] The present invention relates to a method for manufacturing a soluble core for high pressure casting and a soluble core manufactured by the manufacturing method, and more specifically relates to a method for manufacturing a soluble core for high pressure casting using a water-soluble chemical salt having a lower melting point than a cast alloy, and a soluble core having a complex internal shape manufactured by the manufacturing method.

BACKGROUND ART

[0002] In order to manufacture castings with complex internal structures or with undercuts formed thereon, a core technology is required. That is, in a case of gravity casting, a collapsible core using hard sand and the like is generally used, or, as in U.S. Pat. No. 4,629,708, there is used a technology to carry out casting using a water-soluble chemical salt and melt the water-soluble chemical salt into water or steam after casting.

[0003] In high pressure casting such as squeeze casting and die casting, a core technology for forming a water-soluble chemical salt with a high melting point under high pressure has been proposed, as in U.S. Pat. Nos. 3,963,818 and 3,407,864. In addition, a method for forming a core by injecting a slurry melted and heated to 700° C. or higher into a mold has been disclosed, as in U.S. Pat. No. 3,459,253.

[0004] Meanwhile, Korean Patent Publication No. 10-2002-0009334 discloses a high pressure casting core technology using a chemical salt having a lower melting point than a cast alloy. The casting product manufactured by the technology can be usefully applied to manufacturing of die casting products of relatively low heat capacity cast alloys, such as aluminum and magnesium alloys, with a thickness of about 25 mm, but there are limitations in applying the technology to manufacturing of high pressure casting products, such as squeeze casting and die casting, of a thick-walled product having a high heat capacity with a thickness of 25 mm or more or a product with a large change in thickness.

[0005] Therefore, there is a demand for a method for manufacturing a casting that can be usefully applied to die casting products of high heat capacity cast alloys to enable forming of a thick-walled product, and can be transferred to a boundary surface of the core without melting or thermal change.

CITATION LIST

Patent Literature

[0006] PTL1: Korean Patent Publication No. 10-2002-0009334

SUMMARY OF INVENTION

Technical Problem

[0007] The present invention has been created to solve the problems of the prior art as described above, and an object of the present invention is to provide a method for manufacturing a soluble core for high pressure casting, which can

perform high pressure casting of a thick-walled product having a complex shape implemented inside using a core for high pressure casting manufactured with a water-soluble chemical salt having a lower melting point than a cast alloy and a high heat capacity.

[0008] Another object of the present invention is to provide a method for manufacturing a core for high pressure casting, which includes injecting a molten chemical salt, in which a heat-resistant hard powder is uniformly dispersed and mixed so that the molten chemical salt has a melting point 140° C. to 260° C. lower than the melting point of the cast metal and a heat capacity of 90 J/(mol·K) or more, into a core mold and solidifying the molten chemical salt to manufacture the core, and a method for extracting the core by heating thereof in a temperature range equal to or lower than the melting point at which a casting using the soluble core for high pressure casting manufactured by the above manufacturing method is not thermally deformed.

Solution to Problem

[0009] In order to achieve the above object, one aspect of the present invention according to a preferred embodiment of the present invention relates to a method for manufacturing a soluble core for high pressure casting, including: a step of manufacturing a water-soluble chemical salt mixture having a melting temperature of 390° C. to 520° C.; a step of uniformly dispersing and mixing a heat-resistant hard powder into the water-soluble chemical salt mixture to manufacture a molten chemical salt having a heat capacity of 90 J/(mol·K) or more; and a step of injecting the manufactured molten chemical salt into a core mold and solidifying the manufactured molten chemical salt to manufacture a core.

[0010] Casting products manufactured by a technology in the related art can only be applied to manufacturing of die casting products of relatively low heat capacity cast alloys, such as aluminum and magnesium alloys, with a thickness of about 25 mm, and thus there has been a problem that there is a limitation of applying the technology in the related art to high pressure casting products, such as squeeze casting and die casting, of a thick-walled product having a high heat capacity with a thickness of 25 mm or more or products with a large change in thickness. The soluble core manufactured by high pressure casting according to the present invention is characterized in that it is possible to form a thick-walled product with a casting thickness of about 40 mm, and the boundary surface of the core is transferred as it is without melting and thermal change, so that it is advantageous in high pressure casting of a thick-walled product having a complex shape implemented inside.

[0011] The water-soluble chemical salt mixture in the present invention may include any one or more selected from the group consisting of a chloride-based chemical salt, a carbide-based chemical salt, and a sulfide-based chemical salt. The chloride-based chemical salt may include any one or more selected from the group consisting of NaCl, KCl, MnCl₂, CaCl₂, MgCl₂, and LiCl, but is not limited thereto. The carbide-based chemical salt may include any one or more selected from the group consisting of K₂CO₃, Li₂CO₃, and Na₂CO₃, but is not limited thereto. The sulfide-based chemical salt may include any one or more selected from the group consisting of K₂SO₄, Na₂SO₄, and Li₂SO₄, but is not limited thereto.

[0012] The heat-resistant hard powder in the present invention may include any one or more selected from the group consisting of TiO_2 , Al_2O_3 , and ZrSiO_4 .

[0013] The water-soluble chemical salt mixture in the present invention may have a melting point 140°C . to 260°C . lower than the melting point of the cast metal. According to one embodiment of the present invention, a melting temperature of the water-soluble chemical salt mixture may be 390°C . to 520°C . by controlling a mixing ratio of any one or more selected from the group consisting of a chloride-based chemical salt, a carbide-based chemical salt, and a sulfide-based chemical salt.

[0014] The cast metal in the present invention may be, but is not limited to, an aluminum alloy or a magnesium alloy.

[0015] According to one embodiment of the present invention, the melting point of the core is lower than the temperature of the molten metal (670°C . to 720°C .) for casting, which is about 390°C . to 520°C ., but the heat capacity of the core is $90\text{ J}/(\text{mol}\cdot\text{K})$ or more, which is 2.5 times or more the heat capacity of the aluminum alloy ($24.20\text{ J}/(\text{mol}\cdot\text{K})$) and the magnesium alloy ($24.869\text{ J}/(\text{mol}\cdot\text{K})$), both of which are cast metals, and the thermal conductivity coefficient is about 2.4×10^{-4} to $1.2\times 10^{-3}\text{ cal}/\text{cm}$, which is about $1/100$ to $1/200$ of the thermal conductivity coefficient of the steel ($1.8\times 10^{-1}\text{ cal}/\text{cm}$) for the casting mold material, so the cast metal, which is instantly filled during high pressure casting, begins to cool rapidly. At this time, since the thermal conductivity coefficient of the core is lower than that of the steel, which is the mold material, most of the heat of the molten metal is transferred to the mold, and since the heat capacity of the core is high, it takes a lot of time and heat for the core to melt. Therefore, when the core reaches the melting temperature, a solidified layer of cast metal is formed on the boundary surface between the core and the cast metal, and as more time passes, a part of the surface of the core gradually melts, so the cast metal can be formed to have complex internal shapes.

[0016] According to one embodiment of the present invention, a method for extracting a core is as follows: when a casting that has been cast by high pressure using the core is slowly heated at a temperature of 390°C . to 520°C . or higher for 3 to 5 minutes, unlike high pressure casting, heat is transmitted to the interior of the core, so that the core soon becomes molten and flows out of the casting, allowing the core to be easily removed from the casting. The material removed in this way can be reused as a core material.

[0017] In addition, the method for manufacturing a soluble core for high pressure casting in the present invention may further include a step of installing the manufactured core in a high pressure casting mold, performing high pressure casting of a molten metal, and then performing heating to a temperature equal to or less than the melting point of the cast alloy to extract the molten core.

[0018] Another aspect of the present invention relates to a soluble core for high pressure casting manufactured by the above manufacturing method.

[0019] Another aspect of the present invention relates to a soluble core for high pressure casting, characterized in that the core is formed by uniformly dispersing and mixing a heat-resistant hard powder into a water-soluble chemical salt mixture having a melting point 140°C . to 260°C . lower than the melting point of the cast metal, the mixture including any one or more selected from the group consisting of a chloride-based chemical salt, a carbide-based chemical salt, and a sulfide-based chemical salt, to form a molten chemical salt having a heat capacity of $90\text{ J}/(\text{mol}\cdot\text{K})$ or more.

[0020] Another aspect of the present invention relates to a method for extracting a soluble core for high pressure casting, characterized in that the soluble core for high pressure casting is heated to a temperature equal to or less than the melting point of the product after high pressure casting, melted, extracted, and then washed with water.

[0021] Hereinafter, a method for manufacturing a soluble core for high pressure casting according to one embodiment of the present invention will be described in more detail as follows. Specifically, the soluble core for high pressure casting in the present invention can be manufactured by mixing any one or more selected from the group consisting of a chloride-based chemical salt, a carbide-based chemical salt, and a sulfide-based chemical salt such that the melting temperature of the water-soluble chemical salt mixture becomes 390°C . to 520°C . In addition, the core can be manufactured by uniformly dispersing and mixing a heat-resistant hard powder into the water-soluble chemical salt mixture such that the heat capacity of the molten chemical salt becomes $90\text{ J}/(\text{mol}\cdot\text{K})$ or more.

[0022] In the present: the mixing ratio for manufacturing the water-soluble chemical salt mixture can be changed in various ways and can have various embodiments. Since it is possible if the melting temperature range of the chemical salt mixture for a core (390°C . to 520°C .) and the heat capacity of the molten chemical salt are $90\text{ J}/(\text{mol}\cdot\text{K})$ or more, it is not limited to specific components and mixing ratios.

[0023] According to one embodiment of the present invention, the water-soluble chemical salt mixture may be formed of $\text{KCl}:\text{MnCl}_2:\text{NaCl}$ in a ratio of 45.5:33.5:20, $\text{CaCl}_2:\text{KCl}:\text{MgCl}_2:\text{NaCl}$ in a ratio of 41.6:2.2:8.8:47.4, $\text{CrCl}_2:\text{KCl}$ in a ratio of 60:40, $\text{K}_2\text{CO}_3:\text{Li}_2\text{CO}_3:\text{Na}_2\text{CO}_3$ in a ratio of 25:43.5:31.5, $\text{K}_2\text{CO}_3:\text{MgCO}_3$ in a ratio of 55:45, $\text{K}_2\text{SO}_4:\text{Li}_2\text{SO}_4$ in a ratio of 18:82, $\text{K}_2\text{SO}_4:\text{Na}_2\text{SO}_4$ of 75:25, $\text{LiCl}:\text{Li}_2\text{SO}_4:\text{Li}_2\text{CO}_3$ in a ratio of 52.9:27.2:19.8, $\text{LiCl}:\text{Li}_2\text{SO}_4:\text{NaCl}$ in a ratio of 54.8:29:16.1, $\text{LiCl}:\text{Li}_2\text{CO}_3:\text{Li}_2\text{SO}_4$ in a ratio of 52.9:19.8:27.2, and $\text{CaSO}_4:\text{LiCl}$ in a ratio of 14:86, in terms of a mixing ratio (Mol %) of the water-soluble chemical salt mixture, but is not limited thereto.

[0024] Specifically, embodiments of the mixing ratio of components, melting temperature, and heat capacity using some of the chloride-based chemical salts, carbide-based chemical salts, and sulfide-based chemical salts are given in the table below to explain in detail.

TABLE 1

Classification	Type	Mixing ratio (Mol %)	Melting point ($^\circ\text{C}$.)	Heat capacity ($\text{J}/\text{mol}\cdot\text{K}$)
CL-390	$\text{KCl}-\text{MnCl}_2-\text{NaCl}$	45.5-33.5-20	390	92
CL-460	$\text{CaCl}_2-\text{KCl}-\text{MgCl}_2-\text{NaCl}$	41.6-2.2-8.8-47.4	460	102
CL-474	CrCl_2-KCl	60-40	474	95

TABLE 1-continued

Classification	Type	Mixing ratio (Mol %)	Melting point (° C.)	Heat capacity (J/mol · K)
CO-397	K ₂ CO ₃ —Li ₂ CO ₃ —Na ₂ CO ₃	25-43.5-31.5	397	104
CO-460	K ₂ CO ₃ —MgCO ₃	55-45	460	110
SO-520	K ₂ SO ₄ —Li ₂ SO ₄	18-82	520	108
SO-441	K ₂ SO ₄ —Na ₂ SO ₄	75-25	441	106
SC-455	LiCl—Li ₂ SO ₄ —Li ₂ CO ₃	52.9-27.2-19.8	455	94
CSL-458	LiCl—Li ₂ SO ₄ —NaCl	54.8-29-16.1	458	93
CSL-445	LiCl—Li ₂ CO ₃ —Li ₂ SO ₄	52.9-19.8-27.2	445	98
SL-512	CaSO ₄ —LiCl	14-86	512	96

[0025] As shown in the symbol CL-390 in Table 1 above, when the chloride-based chemical salts KCl, MnCl₂, and NaCl are mixed and melted in a ratio of 45.5:33.5:20 (Mol %), the melting point becomes 390° C. and the heat capacity becomes about 92 J/(mol·K).

[0026] Also, as shown in the symbol CO397, when the carbide-based chemical salts K₂CO₃, Li₂CO₃, and Na₂CO₃ are mixed and melted in a ratio of 25:43.5:31.5 (Mol %), the melting point becomes 397° C. and the heat capacity becomes 102 J/(mol·K).

[0027] Also, as shown in the symbol SO-520, when the sulfide-based chemical salts K₂SO₄ and Li₂SO₄ are mixed and melted in a ratio of 18:82 (Mol %), the melting point becomes 520° C. and the heat capacity becomes 108 J/(mol·K).

[0028] Also, as shown in the symbol SC-455, when chloride-based chemical salts, sulfide-based chemical salts, and carbide-based chemical salts, LiCl, Li₂SO₄, and Li₂CO₃ are mixed and melted in a ratio of 52.9:27.2:19.8 (Mol %), the melting point becomes about 455° C. and the heat capacity becomes about 94 J/(mol·K).

[0029] In the same way, as shown in the symbol CSL-445, when chloride-based chemical salts, carbide-based chemical salts, and sulfide-based chemical salts, LiCl, Li₂CO₃, and Li₂SO₄ are mixed and melted in a ratio of 52.9:19.8:27.2 (Mol %), a high pressure casting core material having the melting point of about 445° C. and the heat capacity of about 98 J/(mol·K) can be manufactured.

[0030] A molten chemical salt mixture solution manufactured by uniformly dispersing and mixing heat-resistant hard ceramic particles such as TiO₂, Al₂O₃, and ZrSiO₄ hereto so that the heat capacity becomes 90 J/(mol·K) or more is injected into a core mold and solidified to manufacture a core. Specifically, heat-resistant hard ceramic particles such as TiO₂, Al₂O₃, and ZrSiO₄ can be additionally uniformly dispersed, and by adding 10% to 40% (wt %) of hard ceramic powder, the heat capacity of the core can be further increased, and the mechanical strength can be improved.

[0031] A solution obtained by dispersing and mixing a hard ceramic powder in this way is injected into a core mold and solidified to manufacture a soluble core for high pressure casting.

Advantageous Effects of Invention

[0032] According to the method for manufacturing a soluble core for high pressure casting according to the present invention, the method for manufacturing a core by dispersing a heat-resistant hard ceramic powder in a water-soluble chemical salt having a melting point 140° C. to 260° C. lower than the melting point of a cast metal and a heat capacity of 90 J/(mol·K) or more is a very useful technology

that can easily manufacture a core for high pressure casting of metals such as aluminum and magnesium, and the method for extracting a core from casting can also be simply performed by heating and extracting thereof at a temperature equal to or lower than the melting point of the cast metal, and since the core material can be recycled, it is very effective in terms of productivity and economy.

[0033] In addition, it is advantageous in that a thick-walled product having a complex shape implemented inside can be casted under high pressure using a core for high pressure casting manufactured with a water-soluble chemical salt having a lower melting point than the cast alloy and a high heat capacity of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0034] FIG. 1 shows a shape of a core for high pressure casting (symbol CL-460) according to an embodiment of the present invention.

[0035] FIG. 2 shows a front view and a side view of a high pressure casting mold and a core mounted on a specimen used in an embodiment of the present invention.

[0036] FIG. 3 shows a thermal analysis graph of soluble core (symbol CL-460) according to an embodiment of the present invention.

[0037] FIG. 4 shows a photograph of a high pressure cast product by applying a soluble core (symbol CL-460) according to an embodiment of the present invention.

[0038] FIG. 5 shows a photograph of a core after heating and extraction after high pressure casting by applying a soluble core (symbol CL-460) according to an embodiment of the present invention.

[0039] FIG. 6 shows a photograph of a boundary surface of a core after heating and extraction of a high pressure cast product by applying a soluble core (symbol CL-460) according to an embodiment of the present invention after heating and extracting the core.

[0040] FIG. 7 shows a thermal analysis graph of a soluble core (symbol SL-512) according to an embodiment of the present invention. A thermal analysis method used here is Differential Scanning calorimetry (DSC), which is a method of measuring the difference in energy input to a sample and a reference material as a function of temperature while changing the temperatures of the sample and the reference material.

[0041] FIG. 8 shows a photograph of the boundary surface of a core after heating and extraction of a high pressure cast product by applying a soluble core (symbol CL-512) according to an embodiment of the present invention.

DESCRIPTION OF EMBODIMENTS

[0042] Hereinafter, preferred embodiments of the present invention will be described in detail with reference to the attached drawings.

[0043] The present invention can have various modifications and various embodiments, and specific embodiments are illustrated in the drawings and specifically described in the detailed description. This is not intended to limit the present invention to specific embodiments, but should be interpreted to include all modifications, equivalents, or substitutes included in the spirit and technical scope of the present invention.

[0044] The terms used in the present application are only used to describe specific embodiments and are not intended to limit the present invention. Singular expressions may include plural expressions unless the context clearly indicates otherwise.

[0045] Unless otherwise defined, all terms used herein, including technical or scientific terms, have the same meaning as commonly understood by those having ordinary knowledge in the technical field to which the present invention belongs. Terms defined in commonly used dictionaries may be interpreted as having a meaning consistent with the meaning that the terms have in the context of the relevant art, and may not be interpreted in an idealized or overly formal sense, unless explicitly defined in the present application.

[0046] Hereinafter, specific embodiments of the present invention will be described with reference to the attached drawings.

Embodiment 1

[0047] As shown in the symbol CL-460, when chloride-based chemical salts CaCl_2 , KCl , MgCl_2 , and NaCl are mixed and melted in a ratio of 41.6:2.2:8.8:47.4 (Mol %), the melting point becomes 460°C . and the heat capacity becomes $102\text{ J}/(\text{mol}\cdot\text{K})$. A solution obtained by mixing 14 (wt %) of TiO_2 hard particles of about $20\text{ }\mu\text{m}$ and 30 (wt %) of Al_2O_3 powder of about $80\text{ }\mu\text{m}$ hereto and heating to about 550°C . is injected into a core mold preheated to 200°C . and slowly solidified to manufacture a soluble core.

[0048] The thermal analysis result of the soluble core for high pressure casting manufactured in this way shows that melting starts at 460°C . (melting point 456°C .), as shown in FIG. 3. The core manufactured in this way was mounted in a high pressure casting mold with a casting thickness of about 40 mm , as shown in FIG. 2, and then the performance of the core was evaluated by a high pressure die casting method using AC4C aluminum alloy. For high pressure casting, AC4C aluminum alloy heated to 700°C . was used, the gate injection speed of the molten metal was 55 m/sec , and the final injection pressure was 980 kg/cm^2 . In addition, for core extraction after casting, the casting was heated at a temperature of 500°C . for about 5 minutes to melt and extract the core, and then washed with water.

[0049] FIG. 5 shows a shape of a casting obtained by heating and extracting a core after high pressure casting by the manufacturing method. It can be seen that it is possible to form a thick-walled product with a casting thickness of about 40 mm , and the shape of the core is transferred as it is without melting change. Also, as shown in FIG. 6, it can be seen that the casting surface is clean.

[0050] On the other hand, in a case of a core with a melting temperature of 390°C . or lower, a reaction layer was formed

on the boundary surface of the casting, making it unsuitable for use as a core for high pressure casting of a thick-walled product of about 40 mm .

Embodiment 2

[0051] As shown in the symbol SL-512, when sulfide-based chemical salt CaSO_4 and chloride-based chemical salt LiCl are mixed and melted in a ratio of 14:86 (Mol %), the melting point becomes 512°C . and the heat capacity becomes about $96\text{ J}/(\text{mol}\cdot\text{K})$. A solution obtained by mixing 10 (wt %) of TiO_2 hard particles of about $20\text{ }\mu\text{m}$ and 35 (wt %) of ZrSiO_4 powder of about $120\text{ }\mu\text{m}$ hereto and heating to about 580°C . is injected into a core mold preheated to 300°C . and slowly solidified to manufacture a soluble core. The thermal analysis result of the soluble core for high pressure casting manufactured in this way shows that a peak due to crystal structure changes at 428°C . and a peak due to melting latent heat starts at 512°C . (melting point 512°C .) as shown in FIG. 7. The core manufactured in this way was mounted in a high pressure casting mold, as shown in FIG. 2, and then the performance of the core was evaluated by a high pressure die casting method using AC4C aluminum alloy. For high pressure casting, AC4C aluminum alloy heated to 700°C . was used, the gate injection speed of the molten metal was 55 m/sec , and the final injection pressure was 980 kg/cm^2 . In addition, for core extraction after casting, the casting was heated at a temperature of 530°C . for about 10 minutes to melt and extract the core, and then washed with water.

[0052] FIG. 8 is a cross-section of a casting manufactured by high pressure casting of a thick-walled product by the above-described manufacturing method and then heating and extracting a core. It can be seen that it is possible to form a thick-walled product with a casting thickness of about 40 mm , and the boundary surface of the core is transferred as it is without melting or thermal change.

[0053] On the other hand, when the melting temperature of the core becomes 520°C . or higher, it is difficult to melt and extract the core without causing thermal changes in the casting, making it unsuitable for use as a core for high pressure casting of a thick-walled product.

[0054] Although the present invention has been described in detail through specific embodiments, this is only for the purpose of specifically explaining the present invention, the present invention is not limited thereto, and it is obvious that the present invention can be modified or improved by those having ordinary knowledge in the relevant field within the technical spirit of the present invention.

[0055] All simple modifications or changes of the present invention fall within the scope of the present invention, and the specific protection scope of the present invention will be made clear by the appended claims.

1. A method for manufacturing a soluble core for high pressure casting, comprising:

- a step of manufacturing a water-soluble chemical salt mixture having a melting temperature of 390°C . to 520°C .;
- a step of uniformly dispersing and mixing a heat-resistant hard powder into the above water-soluble chemical salt mixture to manufacture a molten chemical salt having a heat capacity of $90\text{ J}/(\text{mol}\cdot\text{K})$ or more; and
- a step of injecting the manufactured molten chemical salt into a core mold and solidifying the molten chemical salt to manufacture a core.

2. The method for manufacturing a soluble core for high pressure casting according to claim 1,

wherein the water-soluble chemical salt mixture includes any one or more selected from the group consisting of a chloride-based chemical salt, a carbide-based chemical salt, and a sulfide-based chemical salt.

3. The method for manufacturing a soluble core for high pressure casting according to claim 2,

wherein the chloride-based chemical salt includes any one or more selected from the group consisting of NaCl, KCl, MnCl₂, CaCl, MgCl₂, and LiCl,

the carbide-based chemical salt includes any one or more selected from the group consisting of K₂CO₃, Li₂CO₃ and Na₂CO₃, and

the sulfide-based chemical salt includes any one or more selected from the group consisting of K₂SO₄, Na₂SO₄, and Li₂SO₄.

4. The method for manufacturing a soluble core for high pressure casting according to claim 2,

wherein the water-soluble chemical salt mixture is selected from the group consisting of water-soluble chemical salt mixtures of KCl:MnCl₂:NaCl in a ratio of 45.5:33.5:20, CaCl₂:KCl:MgCl₂:NaCl in a ratio of 41.6:2.2:8.8:47.4, CrCl₂:KCl in a ratio of 60:40, K₂CO₃:Li₂CO₃:Na₂CO₃ in a ratio of 25:43.5:31.5, K₂CO₃:MgCO₃ in a ratio of 55:45, K₂SO₄:Li₂SO₄ in a ratio of 18:82, K₂SO₄:Na₂SO₄ in a ratio of 75:25, LiCl:Li₂SO₄:Li₂CO₃ in a ratio of 52.9:27.2:19.8, LiCl:Li₂SO₄:NaCl in a ratio of 54.8:29:16.1, LiCl:Li₂CO₃:Li₂SO₄ in a ratio of 52.9:19.8:27.2, and CaSO₄:LiCl in a ratio of 14:86, in terms of a mixing ratio (Mol %).

5. The method for manufacturing a soluble core for high pressure casting according to claim 1,

wherein the heat-resistant hard powder includes any one or more selected from the group consisting of TiO₂, Al₂O₃, and ZrSiO₄.

6. The method for manufacturing a soluble core for high pressure casting according to claim 1,

wherein the water-soluble chemical salt mixture has a melting point 140° C. to 260° C. lower than a melting point of a cast metal.

7. The method for manufacturing a soluble core for high pressure casting according to claim 1,

wherein a cast metal is an aluminum alloy or a magnesium alloy.

8. The method for manufacturing a soluble core for high pressure casting according to claim 1, further comprising:

a step of installing the manufactured core in a high pressure casting mold, performing high pressure casting of a molten metal, and then performing heating to a temperature equal to or less than the melting point of the cast alloy to extract the molten core.

9. A soluble core for high pressure casting formed of a molten chemical salt having a heat capacity of 90 J/(mol·K) or more obtained by uniformly dispersing and mixing a heat-resistant hard powder into a water-soluble chemical salt mixture having a melting point 140° C. to 260° C. lower than a melting point of a cast metal, which includes any one or more selected from the group consisting of a chloride-based chemical salt, a carbide-based chemical salt, and a sulfide-based chemical salt.

10. The soluble core for high pressure casting according to claim 9,

wherein the chloride-based chemical salt includes any one or more selected from the group consisting of NaCl, KCl, MnCl₂, CaCl, MgCl₂, and LiCl,

the carbide-based chemical salt includes any one or more selected from the group consisting of K₂CO₃, Li₂CO₃ and Na₂CO₃, and

the sulfide-based chemical salt includes any one or more selected from the group consisting of K₂SO₄, Na₂SO₄, and Li₂SO₄.

11. The soluble core for high pressure casting according to claim 9,

wherein the water-soluble chemical salt is selected from the group consisting of water-soluble chemical salt mixtures of KCl:MnCl₂:NaCl in a ratio of 45.5:33.5:20, CaCl₂:KCl:MgCl₂:NaCl in a ratio of 41.6:2.2:8.8:47.4, CrCl₂:KCl in a ratio of 60:40, K₂CO₃:Li₂CO₃:Na₂CO₃ in a ratio of 25:43.5:31.5, K₂CO₃:MgCO₃ in a ratio of 55:45, K₂SO₄:Li₂SO₄ in a ratio of 18:82, K₂SO₄:Na₂SO₄ in a ratio of 75:25, LiCl:Li₂SO₄:Li₂CO₃ in a ratio of 52.9:27.2:19.8, LiCl:Li₂SO₄:NaCl in a ratio of 54.8:29:16.1, LiCl:Li₂CO₃:Li₂SO₄ in a ratio of 52.9:19.8:27.2, and CaSO₄:LiCl in a ratio of 14:86, in terms of a mixing ratio (Mol %).

12. A method for extracting a soluble core for high pressure casting,

wherein the soluble core for high pressure casting according to claim 9 is heated to a temperature equal to or less than the melting point of a product after high pressure casting, melted, extracted, and then washed with water.

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