



(11) **EP 3 075 468 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
05.10.2016 Bulletin 2016/40

(51) Int Cl.:
B22F 1/00 *(2006.01)* **B22F 3/02** *(2006.01)*
B22F 9/00 *(2006.01)*

(21) Application number: **14865338.9**

(86) International application number:
PCT/JP2014/081317

(22) Date of filing: **27.11.2014**

(87) International publication number:
WO 2015/080181 (04.06.2015 Gazette 2015/22)

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME

(72) Inventors:
• **IDO Yasuo**
Sanda-shi
Hyogo 669-1339 (JP)
• **OTANI Shinji**
Sanda-shi
Hyogo 669-1339 (JP)

(30) Priority: **28.11.2013 JP 2013246152**

(71) Applicant: **Mitsubishi Materials Corporation**
Chiyoda-ku
Tokyo 100-8117 (JP)

(74) Representative: **Hoffmann Eitle**
Patent- und Rechtsanwälte PartmbB
Arabellastraße 30
81925 München (DE)

(54) **CLAY-LIKE MOLDED BODY FOR FORMING NOBLE METAL SINTERED COMPACT**

(57) A clay-like shaped body for forming a sintered precious metal body, the clay-like shaped body obtained by shaping a clay-like composition containing at least one powder selected from the group consisting of precious metal powders and precious metal alloy powders, an organic binder, an organic additive and water into ei-

ther a wire-like shape having a diameter of 0.5 mm to 3.0 mm or a sheet-like shape having a thickness of 0.2 mm to 3.0 mm, wherein cracking does not occur when the clay-like shaped body is wound tightly once around the outer peripheral surface of a core rod having a circular cross-sectional shape with a diameter of 13 mm.

EP 3 075 468 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to a clay-like shaped body for forming a sintered precious metal body, obtained by shaping a clay-like composition for forming a sintered precious metal body into a wire-like or sheet-like shape.

[0002] Priority is claimed on Japanese Patent Application No. 2013-246152, filed November 28, 2013, the content of which is incorporated herein by reference.

BACKGROUND ART

[0003] Conventionally, jewelry and fine arts and crafts and the like made of precious metals, typified by rings and the like, are generally produced by the casting or forging of a material containing a precious metal such as silver or gold.

[0004] However, in recent years, precious metal clays containing precious metal powders such as silver or gold (clay-like compositions for forming sintered bodies) have become commercially available, and methods have been proposed for producing precious metal jewelry and fine arts and crafts having any desired shape by making these precious metal clays into the desired arbitrary shape and then performing firing (for example, see Patent Documents 1 to 3).

[0005] By using these types of methods, precious metal clays can be used to freely shape forms in the same manner as typical clay work, and by drying the shaped body obtained by shaping the precious metal clay, and then firing the clay in a heating furnace, precious metal jewelry and fine arts and crafts and the like can be produced extremely easily.

Citation List

Patent Documents

[0006]

Patent Document 1: Japanese Patent No. 4,265,127

Patent Document 2: Japanese Unexamined Patent Application, First Publication No. H04-26707

Patent Document 3: Japanese Unexamined Patent Application, First Publication No. 2005-187858

DISCLOSURE OF INVENTION

Problems to be Solved by the Invention

[0007] When producing this type of sintered precious metal body, the precious metal clay must first be shaped, but because this type of shaping is mainly performed by hand, the clay can sometimes start to dry during this shaping, making processes such as bending more difficult. Ever increasing diversity in design and personal preferences has resulted in more complex shapes for the sintered precious metal bodies, meaning the time required for shaping these bodies has tended to increase. This means conventional clay-like compositions tend to dry out during the shaping process, and if an attempt is made to bend this type of dried composition, then cracks appear in the surface of the clay, and further bending can result in breakage. As a result, when rings or the like are made, the shaping must be completed within a limited time period, meaning there is a limit to the design features that are possible.

[0008] The present invention has been developed in light of these circumstances, and was completed as a result of intensive research aimed at achieving the object described below.

[0009] The present invention has an object of providing a clay-like shaped body for forming a sintered precious metal body, which exhibits excellent flexibility and bendability during shaping of the precious metal clay, enabling shaping operations such as bending to be performed with ease, and is formed as a wire-like or sheet-like shape that is convenient for shaping.

Means for Solving the Problems

[0010] The present invention provides a clay-like shaped body for forming a sintered precious metal body, the clay-like shaped body obtained by shaping a clay-like composition containing at least one powder selected from the group consisting of precious metal powders and precious metal alloy powders, an organic binder, an organic additive and water into either a wire-like shape having a diameter of 0.5 mm to 3.0 mm or a sheet-like shape having a thickness of 0.2 mm to 3.0 mm, wherein cracking does not occur when the clay-like shaped body is wound tightly once around the outer peripheral surface of a core rod having a circular cross-sectional shape with a diameter of 13 mm.

[0011] The clay-like composition used for forming this type of clay-like shaped body for forming a sintered precious metal body is produced by mixing and kneading the one or more powders selected from the group consisting of precious metal powders and precious metal alloy powders, the organic binder, the organic additive and water, and is typically stored and sold in a wrapped state with the composition covered with a packaging material such as a film or the like having excellent gas barrier properties in order to prevent hardening of the composition as a result of drying. The composition is usually in the form of a block, which is shaped into the desired form after removal from the packaging material. At this time, prior to completion of the target product such as a ring or the like, the block of the clay-like composition is processed into a wire-like shape or an elongated sheet-like shape by squeezing and stretching and the like, and this wire-like shape or sheet-like shape is then subjected to further processing such as bending into a round shape. However, after removal from the packaging material, the clay-like composition tends to start drying and hardening in a comparatively short period of time, and because considerable time is required to process the composition into a wire-like shape or sheet-like shape, when that shape is subsequently bent into a round shape, there is a possibility of cracking occurring. Accordingly, the clay-like composition must be shaped within a relatively short time after removal from the packaging material, meaning there is a limit to the product shapes that can be produced.

[0012] The clay-like shaped body for forming a sintered precious metal body according to the present invention is shaped into a wire-like or sheet-like shape of prescribed dimensions, and suffers no cracking when wound tightly once around the outer peripheral surface of a core rod having a circular cross-sectional shape with a diameter of 13 mm, and can therefore easily be shaped into a ring or the like by bending the clay-like shaped body into a round shape after removal from the packaging material. Because the clay-like shaped body has already been formed into a wire-like or sheet-like shape, the time required for processing the composition into this type of shaped form can be saved, enabling a greater length of time to be spent on shaping operations closer to the shape of the final product, and therefore more intricate product shapes can be produced, and a wider variety of demands can be met.

[0013] For the clay-like shaped body for forming a sintered precious metal body according to the present invention, it is preferable that the initial hardness measured using a type E durometer is from E8 to E20, and that the hardness after standing for one hour at room temperature is E40 or less.

[0014] In the case of a conventional clay-like composition, the composition is comparatively soft and easily shaped immediately following removal from the packaging material, but the hardness increases as time passes, making bending and the like of the composition during shape formation difficult.

[0015] The clay-like shaped body for forming a sintered precious metal body according to the present invention has an initial hardness immediately following removal from the packaging material of E8 to E20, and has a hardness after standing for one hour at room temperature of E40 or less. Accordingly, the increase over time in the hardness of the clay-like shaped body for forming a sintered precious metal body is small, and therefore the ability to further shape the shaped body during shaping operations is not impaired as a result of large increases in the hardness of the clay-like shaped body for forming a sintered precious metal body, meaning the clay-like composition maintains excellent flexibility and bendability, and rings and the like can be produced with comparative ease.

[0016] In this description, the initial hardness refers to the hardness value measured within the period of about one minute required for removing the clay-like shaped body for forming a sintered precious metal body from the enclosing packaging material and then performing the measurement using a durometer. Further, the hardness after standing refers to the hardness measured after leaving the clay-like shaped body for forming a sintered precious metal body to stand for one hour at room temperature after removal from the enclosing packaging material.

[0017] When the type E hardness value satisfies the above range, shaping of the clay-like shaped body is simple, and even if the hardness increases somewhat during the shaping process, it does not impede the shaping. Further, when the hardness after standing satisfies the above range, satisfactory flexibility is maintained even after one hour at room temperature, and shaping is possible even after this one hour has passed. Consequently, it is possible to shape the clay-like shaped body for about 30 minutes to prepare a partially finished product, subsequently store the partially finished product by sealing inside a packaging material, and then once again remove the partially finished product from the packaging material to complete the shaping process at a later time, meaning the clay-like shaped body can be used in those cases where the shaping operation is temporarily interrupted and then restarted at a later time.

Effects of the Invention

[0018] Because the clay-like shaped body for forming a sintered precious metal body according to the present invention is shaped into a wire-like or sheet-like shape of prescribed dimensions, subsequent shaping can be performed easily, and cracking does not occur when the clay-like shaped body is wound tightly once around the outer peripheral surface of a core rod having a circular cross-sectional shape with a diameter of 13 mm, and therefore shapes such as rings can be produced with comparative ease, and more intricate product shapes can be produced.

BEST MODE FOR CARRYING OUT THE INVENTION

[0019] The clay-like shaped body for forming a sintered precious metal body according to the present invention is obtained by shaping a clay-like composition containing at least one powder selected from the group consisting of precious metal powders such as gold powder and silver powder and precious metal alloy powders, an organic binder, an organic additive and water into either a wire-like shape having a diameter of 0.5 mm to 3.0 mm or a sheet-like shape having a thickness of 0.2 mm to 3.0 mm. Propylene glycol can be used favorably as the organic additive, and glycerol and polyethylene glycol may also be added.

[0020] This clay-like shaped body for forming a sintered precious metal body is stored and sold in a wrapped state with the shaped body sealed with a packaging material having gas barrier properties, and following removal from the packaging material, the clay-like shaped body has a property wherein cracking does not occur when the clay-like shaped body is wound tightly once around the outer peripheral surface of a core rod having a circular cross-sectional shape with a diameter of 13 mm. Further, if the hardness measured using a type E durometer immediately after removal of the clay-like shaped body from the packaging material (including the time of about one minute required for performing the measurement) is deemed the initial hardness, and the hardness after standing for one hour at room temperature after removal from the packaging material is deemed the hardness after standing, then the initial hardness is from E8 to E20, and the hardness after standing is E40 or less.

[0021] The diameter and thickness and the like of the clay-like shaped body for forming a sintered precious metal body can be ascertained using calipers or the like.

[0022] Further, a type E durometer refers to a test instrument used for measuring low hardness values prescribed in JIS K 6253-1 (hardness measurement range: < A20)

(wherein JIS K 6253-1 conforms to ISO 18517, and in ISO 7619-1, a type E durometer is referred to as a type AO durometer).

[0023] A more detailed description of the invention is provided below.

(a) Precious Metal Powder, Precious Metal Alloy Powder

[0024] For the precious metal powder and/or precious metal alloy powder used in the present invention, gold powder, silver powder, copper powder, platinum powder, or powders of alloys of these metals can be used. Further, a mixed powder of silver powder and copper powder may also be used. In terms of silver alloy powders, a silver-copper alloy can be used particularly favorably. At least one powder selected from the group consisting of these precious metal powders and precious metal alloy powders functions as the main component of the clay-like composition that constitutes the clay-like shaped body for forming a sintered precious metal body. The amount of this powder is not a predominant condition, provided the effects of the present invention are achieved, but in order to obtain a more practical clay-like composition, the amount of the powder is preferably at least 50 mass% but not more than 95 mass%. In other words, if the amount is less than 50 mass%, then the texture and luster of the precious metal may not appear, whereas if the amount exceeds 95 mass%, then the extensibility and strength of the clay-like composition tend to deteriorate undesirably. The amount of the one or more powders selected from the group consisting of precious metal powders and precious metal alloy powders within the clay-like composition that constitutes the clay-like shaped body for forming a sintered precious metal body is more preferably at least 70 mass% but not more than 95 mass%.

(b) Organic Binder

[0025] The organic binder used in the present invention may be formed from one material, or a combination of two or more materials, selected from among cellulose-based binders, polyvinyl-based binders, acrylic-based binders, wax-based binders, resin-based binders, starch, gelatin and flour. Further, among the above, the organic binder is preferably formed from a cellulose-based binder, and is most preferably formed from a water-soluble cellulose such as methyl cellulose.

[0026] The amount of this organic binder is not a predominant condition, provided the effects of the present invention are achieved, but in order to obtain a more practical clay-like composition that constitutes the clay-like shaped body for forming a sintered precious metal body, the amount of the organic binder in the clay-like composition is preferably at least 2 mass% but not more than 12 mass%, and is more preferably at least 2 mass% but not more than 10 mass%.

(c) Organic Additive

[0027] Propylene glycol can be used as the organic additive used in the present invention. In this case, if the amount of the organic additive is too small, then the clay-like shaped body tends to dry over time, increasing the likelihood of a reduction in the flexibility, whereas if the amount of the organic additive is too large, then the formability of the clay-like

composition tends to deteriorate, making shaping difficult, and therefore the amount of the organic additive is preferably from 0.1 mass% to 3.0 mass%, and more preferably from 0.5 mass% to 2 mass%.

[0028] Moreover, by also adding at least one other organic additive selected from the group consisting of glycerol and polyethylene glycol in addition to the propylene glycol, the flexibility of the clay-like composition after drying can be further improved.

[0029] In those cases when glycerol and a polyethylene glycol are added, the combined mass of the propylene glycol, the glycerol and the polyethylene glycol is preferably adjusted so as to satisfy a range from 0.1 mass% to 3.0 mass%, and is more preferably adjusted so as to satisfy a range from 0.5 mass% to 1.8 mass%. Glycerol and polyethylene glycol are liquid substances that have both hydrophilic and lipophilic properties, and it is known that including these substances in a clay-like composition imparts viscosity to the composition, but by adding these substances to the clay-like composition together with propylene glycol, the effect of the invention in preventing drying of the clay-like composition and deterioration in the flexibility of the clay-like composition even when left to stand for a long period of time can be further strengthened compared with the case where the propylene glycol is added alone.

[0030] Moreover, if required, at least one additive selected from among fatty substances, olive oil and surface active agents may also be added to the clay-like composition of the present invention.

[0031] The amount of this additive varies depending on its purpose, but the amount within the clay-like composition is preferably at least 0.1 mass% but not more than 1 mass%, and is more preferably at least 0.1 mass% but not more than 0.5 mass%.

[0032] Examples of the fatty substance include organic acids (such as oleic acid, stearic acid, phthalic acid, palmitic acid, sebacic acid, acetylcitric acid, hydroxybenzoic acid, lauric acid, myristic acid, caproic acid, enanthic acid, butyric acid and capric acid), organic esters (such as organic acid esters having a methyl group, ethyl group, propyl group, butyl group, octyl group, hexyl group, dimethyl group, diethyl group, isopropyl group or isobutyl group), higher alcohols (such as octanol, nonanol and decanol), polyhydric alcohols (such as glycerol, arabitol and sorbitan), and ethers (such as dioctyl ether and didecyl ether).

[0033] By adding and mixing a surface active agent into the clay-like composition, the solid matter generated by the reaction between the binder and the water can be converted to powder form, and the mixability of the precious metal powder and the binder can be improved. There are no particular limitations on the type of surface active agent, and a typical surface active agent may be used. The term "surface active agent" is a generic name for a substance that has a water-compatible portion (hydrophilic group) and an oil-compatible portion (lipophilic group, hydrophobic group) within the same molecule, and if it satisfies this definition, then the aforementioned polyethylene glycol used in the present invention may also be considered a surface active agent. However, when used in this instance, the term "surface active agent" excludes the polyethylene glycol added with the anticipation of achieving the characteristic effects of the present invention, but rather refers to sodium lauryl sulfate or a polyoxyethylene alkyl ether or the like that is added in a prescribed amount in order to achieve a dispersion or aggregation effect, a foaming or defoaming effect, a wettability improvement effect, a softening and smoothing effect, or an antistatic effect or the like.

[0034] When producing a clay-like shaped body for forming a sintered precious metal body with the type of composition described above, first, the organic binder, the organic additive and the water, and if required the fatty substance, olive oil and/or surface active agent, are stirred and mixed inside a container fitted with a stirrer. The resulting mixed solution is then introduced into a kneading device together with the precious metal powder.

[0035] There are no particular limitations on the amount of water in the clay-like composition that constitutes the clay-like shaped body for forming a sintered precious metal body, but the amount is preferably from 3 mass% to 35 mass%, and is more preferably from 3 mass% to 20 mass%.

[0036] A stainless steel kneading device may be used as the kneading device, and the internal walls of the kneading device are preferably coated with CrN. This CrN coating has excellent wear resistance as well as excellent lubricity, and can therefore suppress Fe contamination.

[0037] By kneading the precious metal powder and the mixed solution in the kneading device, a clay-like composition can be produced.

[0038] In the method described above, the fatty substance or the like was added during the stirring and mixing of the mixed solution, but the organic binder, the organic additive and the water may first be stirred and mixed, with the fatty substance or the like then added when the precious metal powder is kneaded with the mixed solution inside the kneading device.

[0039] Following removal from the kneading device, the clay-like composition is divided into blocks of appropriate size, and then shaped into either a wire-like shape having a diameter of 0.2 mm to 3.0 mm or a sheet-like shape having a thickness of 0.2 mm to 3.0 mm to prepare the clay-like shaped body for forming a sintered precious metal body. During this shaping, the block of the clay-like composition is first stretched thinly into a sheet-like form by flattening with a roller or the like. In order to form the aforementioned sheet-like shaped body, the rolled sheet is cut into strips of an appropriate size with a width of at least 1.0 mm. In order to form the wire-like shaped body, the sheet is cut into strips of an appropriate width, and these strips are then rolled into a wire-like form.

[0040] The wire-like or sheet-like clay-like shaped body for forming a sintered precious metal body shaped in this manner is then wrapped in a packaging material for storage and sale.

[0041] Examples of materials that can be used as the packaging material include films formed from resins having gas barrier properties such as polyvinylidene chloride (PVDC), metal foils, and laminated films comprising a metal layer and a resin layer. These packaging materials cover the outer surface of the clay-like shaped body for forming a sintered precious metal body in a tightly sealed state, thereby preventing contact with the outside air. Further, a bag-like packaging material formed from the types of films described above may also be used. Moreover, instead of using a film, a container capable of accommodating the clay-like shaped body for forming a sintered precious metal body, such as a box or can or the like formed from a material having gas barrier properties, may also be used as the packaging material.

[0042] Immediately after removal from this packaging material, the clay-like shaped body for forming a sintered precious metal body suffers no cracking when wound tightly once around the outer peripheral surface of a core rod having a circular cross-sectional shape with a diameter of 13 mm. Further, the clay-like shaped body has an initial hardness, measured using a type E durometer in accordance with JIS K 6253, that is from E8 to E20, and from this initial hardness, has a hardness after standing for one hour at room temperature that is E40 or less. The initial hardness of the clay-like shaped body for forming a sintered precious metal body is more preferably from E8 to E18, and still more preferably from E8 to E 15. Further, the hardness of the clay-like shaped body after standing for one hour at room temperature is more preferably E36 or less, and the lower limit for this value is preferably at least as large as the initial hardness.

[0043] Room temperature refers to a temperature of 15 to 30°C, and preferably 23°C.

[0044] In order to produce a sintered precious metal body from this clay-like shaped body for forming a sintered precious metal body, the clay-like shaped body for forming a sintered precious metal body is first removed from the packaging material and used to form the desired shaped product by operations such as rounding, and the resulting shaped product is then dried by exposure to hot air or the like. The shaped product hardens upon drying, and following additional fine shaping using a file, cutter or chisel or the like as required, the shaped product is fired to produce a sintered precious metal body. Following firing, polishing of the surface reveals the luster of the precious metal, enabling completion of the ornament or the like.

[0045] Because this clay-like shaped body for forming a sintered precious metal body has already been shaped into a wire-like or sheet-like form, manual operations such as kneading and stretching of the clay-like composition can be omitted, and in the case of shaping a ring, the ring-like shape can be formed relatively simply by bending the wire-like or sheet-like shaped body into a rounded shape. Accordingly, greater time can be spent on fine shaping of the ring and forming patterns on the ring surface and the like.

[0046] In the shaping operations described above, following removal of the clay-like shaped body for forming a sintered precious metal body from the packaging material, because the clay-like shaped body suffers no cracking when wound tightly once around the outer peripheral surface of a core rod having a circular cross-sectional shape with a diameter of 13 mm, shaping of a ring or the like can be performed easily. Further, because the initial hardness is from E8 to E20, shaping of the clay-like shaped body by manual operations following removal from the packaging material is very easy. At this time, the clay-like shaped body exhibits excellent flexibility, and exists in a state where only the surface has dried, meaning it is unlikely to stick to the packaging material, and can be removed easily from the packaging material.

[0047] Further, because the hardness of the clay-like shaped body for forming a sintered precious metal body upon standing for one hour at room temperature following removal from the packaging material is E40 or less, the clay-like shaped body does not harden so much that shaping becomes impossible during the shaping process. The shaping of a ring or the like is usually substantially complete within about one hour of removing the clay-like shaped body for forming a sintered precious metal body from the packaging material, and if the hardness after standing for this period is still E40 or less, then an essentially stable shaping operation can be performed from that start of shaping until the completion, thus enabling a shaped product of the desired shape to be produced with comparative ease. During the shaping process, if the clay-like shaped body is a sheet-like shaped body, then this sheet-like shaped body may also be stamped out using a mold or the like, and even in these types of cases, the shaped body is unlikely to suffer cracking or the like.

[0048] Furthermore, because the hardness after standing is still comparatively low, the clay-like shaped body for forming a sintered precious metal body still retains satisfactory flexibility even one hour after removal from the packaging material, and can therefore still be shaped even after this one-hour period has elapsed. Accordingly, it is possible to shape the clay-like shaped body for forming a sintered precious metal body for about 30 minutes to prepare a partially finished product, subsequently store the partially finished product for a period of time by sealing inside a packaging material, and then once again remove the partially finished product from the packaging material to complete the shaping process.

[0049] Because the clay-like shaped body for forming a sintered precious metal body can be used in these types of cases where the shaping operation is temporarily interrupted and then restarted at a later time, it is possible to perform shaping across a plurality of steps, with the shaping operation interrupted between steps and then restarted at a later time, and therefore shaping can be performed using all manner of methods in shaping classrooms and the like.

EXAMPLES

[0050] First, methyl cellulose as the organic binder, propylene glycol as organic additives, glycerol, polyethylene glycol, a surface active agent and olive oil, and water were stirred and mixed inside a container fitted with a stirrer, and the resulting mixed solution was then introduced, together with a silver powder, into a kneading device.

[0051] By kneading the silver powder, the binder mixed solution and the water inside the kneading device, clay-like compositions having the formulations shown in Table 1 were produced, and after stretching into a sheet-like form by flattening with a roller, each composition was used to prepare two different shaped materials, namely a strip-like sheet material having a width of 5 mm, a thickness of 2 mm and a length of 70 mm, and a wire-like material having a diameter of 1.5 mm. These shaped materials were each wrapped in a film-like packaging material formed from polyvinylidene chloride.

[0052] One week after production, each clay-like shaped body for forming a sintered precious metal body was removed from the packaging material and wound tightly once around the outer peripheral surface of a stainless steel circular rod (core rod) having a diameter of 13 mm, and the outer peripheral surface of the clay-like shaped body was checked for cracking. If one or more cracks of 1 mm or more (visually detectable cracks) had formed, an evaluation of "B" was recorded, whereas if no cracks of 1 mm or more were detected, an evaluation of "A" was recorded.

[0053] Further, the hardness immediately following removal from the packaging material was measured using a type E durometer in accordance with JIS K 6253. Removing the clay-like shaped body for forming a sintered precious metal body from the packaging material, installing it in the durometer and then starting the measurement required about one minute. The hardness at this point was recorded as the initial hardness.

[0054] Further, the hardness after the clay-like shaped body for forming a sintered precious metal body was left to stand for 30 minutes in a constant-temperature constant-humidity chamber at room temperature and a humidity of 40% following removal from the packaging material was also measured in the same manner using the type E durometer.

[0055] The evaluation results are shown in Table 1.

[Table 1]

	Composition formulation (mass%)							Hardness (type E)		Cracking upon winding
	Silver powder	Methyl cellulose	Surface active agent	Propylene glycol	Glycerol	Polyethylene glycol	Water and others	Initial hardness	Hardness after standing	
Example 1	90	1	0.2	0.8	0.2	0.2	balance	10	30	A
Example 2	90	1.2	0.2	0.6	0.2	0.2	balance	15	35	A
Example 3	90	1.7	0.2	0.3	0.1	0.1	balance	20	40	A
Comparative Example 1	90	1.2	0.2	0	0	0.1	balance	22	60	B

[0056] From the results in Table 1 it is evident that each of the clay-like shaped bodies for forming a sintered precious metal body in the Examples suffered no cracking even when wound tightly once around the outer peripheral surface of the stainless steel circular rod with a diameter of 13 mm. Further, not only was the initial hardness low, but the increase in the hardness over time was minimal, with the hardness after standing being E40 or less, meaning shaping was still possible even after about one hour had elapsed from the initial state.

[0057] The present invention is not to be considered as being limited by the above examples, and various modifications can be made without departing from the spirit or scope of the present invention.

Claims

1. A clay-like shaped body for forming a sintered precious metal body, the clay-like shaped body obtained by shaping a clay-like composition comprising at least one powder selected from the group consisting of precious metal powders and precious metal alloy powders, an organic binder, an organic additive and water into either a wire-like shape having a diameter of 0.5 mm to 3.0 mm or a sheet-like shape having a thickness of 0.2 mm to 3.0 mm, wherein cracking does not occur when the clay-like shaped body is wound tightly once around an outer peripheral surface of a core rod having a circular cross-sectional shape with a diameter of 13 mm.
2. The clay-like shaped body for forming a sintered precious metal body according to Claim 1, wherein the clay-like shaped body has an initial hardness measured using a type E durometer of E8 to E20, and has a hardness after standing for one hour at room temperature of E40 or less.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2014/081317

A. CLASSIFICATION OF SUBJECT MATTER

B22F1/00(2006.01)i, B22F3/02(2006.01)i, B22F9/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B22F1/00, B22F3/02, B22F9/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2014

Kokai Jitsuyo Shinan Koho 1971-2014 Toroku Jitsuyo Shinan Koho 1994-2014

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2007-154304 A (Susumu YOSHIDA), 21 June 2007 (21.06.2007), paragraphs [0008] to [0020] (Family: none)	1-2
A	JP 2002-97501 A (Aida Chemical Industries Co., Ltd.), 02 April 2002 (02.04.2002), entire text (Family: none)	1-2
A	JP 2001-234081 A (Padico Co., Ltd.), 28 August 2001 (28.08.2001), paragraphs [0022] to [0023] (Family: none)	1-2



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T"

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X"

document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y"

document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"

document member of the same patent family

Date of the actual completion of the international search
24 December 2014 (24.12.14)Date of mailing of the international search report
13 January 2015 (13.01.15)Name and mailing address of the ISA/
Japan Patent Office

Authorized officer

Facsimile No.

Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2014/081317

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, A	WO 2014/157527 A1 (Mitsubishi Materials Corp.), 02 October 2014 (02.10.2014), entire text; all drawings & JP 2014-189896 A	1-2

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2013246152 A [0002]
- JP 4265127 B [0006]
- JP H0426707 B [0006]
- JP 2005187858 A [0006]