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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

*Ex parte* KIYOHITO ISHIDA,
KIYOSHI YAMAUCHI, RYOSUKE KAINUMA,
YUJI SOTO, and TOSHIHIRO OMORI

Appeal 2011-009988
Application 12/098,746
Technology Center 1700

Before MICHAEL P. COLAIANNI, GEORGE C. BEST, and
GRACE KARAFFA OBERMANN, *Administrative Patent Judges*.

BEST, *Administrative Patent Judge*.

DECISION ON APPEAL

On June 18, 2010, the Examiner finally rejected claims 8, 9, 11, and 12 of Application 12/098,746 under 35 U.S.C. § 103(a) as obvious. Appellants seek reversal of this rejection pursuant to 35 U.S.C. § 134(a). We have jurisdiction under 35 U.S.C. § 6(b).

For the reasons set forth below, we REVERSE.

## BACKGROUND

The '746 application describes cobalt-based alloys for use in applications where high strength is required (Spec. 1). Examples of such applications include medical instruments, industrial tools, and biomaterials (*id.*). The '746 application further describes the claimed alloys as having enhanced workability relative to prior art alloys used in such applications (*id.*).

The prior art describes the addition of various alloying metals such as chromium, nickel, iron, and molybdenum to cobalt for various purposes, including material strengthening (*id.*). The resulting cobalt-based alloys can be strengthened by various methods, including solid solution strengthening, precipitation strengthening, and work hardening (*id.*). The alloys produced by these methods have a metallic structure comprising either a single α phase or an α phase containing a continuously precipitated secondary phase (*id.*).

Other alloy systems use a strengthening method that relies upon the formation of a lamellar structure comprising layers of two different phases of the alloy (*id.*). In particular, Appellants admit that a cobalt-aluminum alloy system having a lamellar structure is known (*id.* at 2 (citing P. Zieba, 46 *Acta Mater.* 369-377 (1998))). The binary cobalt-aluminum alloy, however, has extremely low ductility compared to other materials and therefore is very difficult to shape by cold working (*id.*). Accordingly, Appellants sought to improve the properties of the cobalt-aluminum alloy by the addition of additional components and changes in the heat treatment and working conditions used to produce the alloy (*id.* at 2-3). The '746

application describes and attempts to claim the results of these investigations.

Claim 8 is representative of the '746 application's claims and is reproduced below:

> 8. A high-strength Co-based alloy produced by the steps of:
>
> dissolving a Co-based alloy having a composition that comprises, on the basis of mass percent,
>
> 3 to 13% of Al, and
>
> 0.01 to 60% of one or more workability enhancing elements selected from the group consisting of 0.01 to 50% of Ni, 0.01 to 40% of Fe and 0.01 to 30% of Mn;
>
> solidifying with an average cooling rate of 50 to 200°C/min in the range of 1500 to 600°C; and
>
> performing cold working at a working ratio of 10% or more;
>
> wherein the high-strength Co-based alloy has a metallic structure having a lamellar structure wherein a [*sic*, an] f.c.c. structure α-phase and β(B2)-phase with an interlayer spacing of 100 μm or less are repeated in layers and the occupancy ratio is 30% by volume or more.

(App. Br. 18 (Claims App'x)).

## REJECTIONS

The Examiner finally rejected claims 8, 9, 11, and 12 of the '746 application under 35 U.S.C. § 103(a) as obvious over JP 2004-238720 ("Ishida," published Aug. 26, 2004).[1]

[1] We rely upon and cite to the English-language translation that is of record in the '746 application.

## DISCUSSION

The Examiner rejected all four independent claims of the '746 application as obvious over Ishida. For the reasons set forth below, we reverse.

Ishida describes a cobalt-based shape memory alloy system. Ishida ¶ [0001]. In particular, Ishida describes an alloy consisting of cobalt and one or more of at least 29 different alloying materials in various amounts. *Id.* at ¶¶ [0008], [0012]. The shape memory alloy is further defined by its structure. *Id.* at ¶ [0018]. In particular, Ishida's alloy comprises either (1) a monophase tissue comprising a γ phase bearing a face-centered cubic ("f.c.c.") structure or (2) a polyphase tissue comprising a γ phase with an f.c.c. structure together with a second, different phase. *Id.*

Ishida describes the production of its shape memory alloy as involving at least the following steps: (1) solubilizing the aforementioned elements in an inert gas atmosphere, (2) solidifying the alloy and shaping the material into a specified shape by means of hot processing and cold processing, and (3) a second solubilizing treatment, optionally followed by an ageing treatment. *Id.* at ¶¶ [0017]-[0018].

Here the Examiner correctly found that Ishida's broad disclosure of a large number of alloy compositions included alloys comprised of 0.1 – 11% aluminum and one or more of (a) 0.01 – 40% nickel, (b) 0.01 – 40% iron, and (c) 0.01 – 40% manganese, with the balance consisting of cobalt (Ans. 3-4). As the Examiner points out, the amounts of aluminum, nickel, iron, and manganese described in Ishida's broad disclosure substantially overlap with the ranges set forth in the '746 application's claims (*id.*).

As the Examiner admits, Ishida (1) describes the matrix of the alloy produced in its process as an f.c.c. γ phase and not the claimed f.c.c. α phase,

and (2) does not disclose the lamellar structures required by claims 8, 9, 11, and 12 of the '746 application (Ans. 6). The Examiner, however, argues that Ishida discloses alloys with compositions that overlap the composition limitations in the '746 application's claims, and that Ishida's alloys are produced by a substantially similar production process (*id.*). The Examiner therefore found that (1) there is "a reasonable expectation that the prior art of Ishida actually has 'a[n] f.c.c. structure α-phase,'" and (2) a person of ordinary skill in the art "would have reasonably expected Ishida to have the claimed microstructure(s)" (*id.*).

Based upon the foregoing factual determinations, the Examiner determined that there was a prima facie case of obviousness and placed the burden of proving the existence of an unobvious difference between the claimed and prior art products on Appellants (*id.* at 7).

Appellants assert that the Examiner has not properly demonstrated the existence of a prima facie case of obviousness (App. Br. 10). Because we agree with Appellants, we reverse the Examiner's rejection of claims 8, 9, 11, and 12 of the '746 application.

The Examiner failed to demonstrate a prima facie case of obviousness for multiple reasons. *First*, the Examiner's finding that there is "a reasonable expectation that the prior art of Ishida actually has 'a[n] f.c.c. structure α-phase'" (Ans. 6) is not supported by adequate evidence or reasoning. The Examiner claims that this finding is supported by Ishida's description of alloys having "a face-centered cubic (FCC) gamma phase (instead of the instantly claimed alpha FCC) with a second phase of beta B2" (*id.* (citing Ishida ¶¶ [0011], [0016], [0027], claim 6, and Abstract)). Our review of Ishida reveals discussion of a single working example that is described as having a polyphase tissue made of a γ phase matrix with a dispersed

secondary phase consisting of "a CoAl bearing a B2 structure." Ishida ¶ [0027] (discussing Ex. 5). Based on this description, the Examiner infers that there is a reasonable likelihood that Ishida erred in identifying the matrix of all of its alloys as γ phase rather than α phase material (Ans. 6).

We are not convinced by the Examiner's argument. The Examiner's argument is based on a discussion of a single working example that does not have a composition that would meet any of the '746 application's claims because it does not include any nickel, iron, or manganese. *See* Ishida ¶ [0023] (Table I, Ex. 5). None of Ishida's other working examples are described as including a B2 structure as a secondary phase. Moreover, the working examples in Ishida having compositions that fall within the '746 application's claims, *id.* (Exs. 9-12), do not invariably comprise a material that includes a secondary phase, *see id.* (Table I, part 2). Thus, Ishida does not provide any support for the Examiner's assertion that it describes or suggests that the claimed alloys would have the required phase composition.

Furthermore, the Examiner provides no basis for his apparent assumption that a β (B2) secondary phase can only occur within an α phase matrix rather than a γ phase matrix. The record contains descriptions of both sorts of material, and the Examiner does not explain why one of them likely is erroneous, let alone why the error—if there were one—would be one that supports his assertion of a prima facie case of obviousness.

*Second*, even if we assume that the Examiner were correct in his assertion that Ishida's description of a cobalt-aluminum alloy having an f.c.c. γ phase matrix and a dispersed secondary phase consisting of B2 material suggests that alloys with different compositions would have an f.c.c. α phase matrix with a dispersed β(B2) secondary phase, the Examiner still has not adequately explained where or how Ishida describes or suggests

the particular lamellar structure claimed in the '746 application. As Appellants point out, Ishida describes a manufacturing process for its alloys that necessarily includes a second solubilizing step after cold working the material into a desired shape (App. Br. 10-15). Appellants provide unrebutted evidence that material processed in this manner does not always include the claimed structure (*id.* at 13-14 (discussing T. Omori et al., *Shape Memory Effect in the Ferromagnetic Co-14 at% Al Alloy*, 52 SCRIPTA MATERIALIA 565-569 (2005))). Omori shows that after the second solubilizing step, a cobalt-aluminum alloy primarily comprises a hexagonal close packed ε phase. Omori, 52 SCRIPTA MATERIALIA at 566-67. The Examiner discounts this evidence because Omori presents a study of a cobalt-aluminum alloy rather that the specific alloys claimed in the '746 application (Ans. 10-11). The Examiner has not provided a rational basis for relying upon Ishida's description of a cobalt-aluminum alloy that contains a B2 secondary phase when it supports the position taken in the rejection (*see* Ans. 6), but discounting studies of a cobalt-aluminum alloy when those studies are inconsistent with the findings made in the rejection.

*Third*, even if we assume that Ishida's process results in material that has the claimed structure prior to the second solubilizing step, the Examiner has not explained why a person of ordinary skill in the art would have omitted the second solubilizing step from Ishida's process. As Omori demonstrates, use of the secondary solubilizing step and subsequent aging of a cobalt-aluminum alloy increases the alloy's shape memory properties. Therefore a person of ordinary skill in the art would have no incentive to omit the process steps that would destroy the claimed structure in Ishida's materials.

## CONCLUSION

Because the Examiner has not demonstrated the existence of a prima facie case of obviousness, we reverse the rejection of claims 8, 9, 11, and 12 under 35 U.S.C. § 103(a).

## REVERSED

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