

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 12

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte GREGORY K. RASMUSSEN, JINPING ZHANG,
FENGLIAN CHANG and TERRY J. GOLD

Appeal No. 2004-1032
Application No. 09/835,510

ON BRIEF

Before PAK, KRATZ and TIMM, Administrative Patent Judges.
KRATZ, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 1-6, 12 and 13, which are all of the claims pending in this application.

BACKGROUND

Appellants' invention relates to a thin film shape memory alloy of a specified composition. According to appellants, their alloy possesses "reduced hysteresis, faster actuation times, and

better mechanical properties than for example, ternary Ni-Ti-Hf thin films" (brief, page 4). An understanding of the invention can be derived from a reading of exemplary claim 1, which is reproduced below.

1. A nickel titanium hafnium copper thin film shape memory alloy having a composition $(\text{TiHf})_{50-55}(\text{NiCu})_{45-50}$ comprising about 2 atomic percent to about 10 atomic percent copper.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Melton et al. (Melton)	4,144,057	Mar. 13, 1979
AbuJudom, II et al. (AbuJudom)	5,114,504	May 19, 1992
Johnson et al. (Johnson)	5,325,880	Jul. 05, 1994

Claims 1-6, 12 and 13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over AbuJudom in view of Melton and Johnson.

We refer to the brief and to the answer for a complete exposition of the opposing viewpoints expressed by appellants and the examiner concerning the issues before us on this appeal.

OPINION

Having carefully considered each of appellants' arguments set forth in the brief, appellants have not persuaded us of

reversible error on the part of the examiner. Since we agree with the examiner's conclusion of obviousness as set forth in the answer, we will affirm the examiner's rejection. We offer the following for emphasis.

Appellants state that "[t]he claims stand together" (brief, page 4). Accordingly, we select claim 1 as the representative claim on which we decide this appeal. See 37 CFR § 1.192(c)(7 and 8) (2002).

While AbuJudom teaches a shape memory alloy that includes nickel (Ni), titanium (Ti) and hafnium (Hf) as primarily focused upon by the examiner in the answer and appellants in the brief, AbuJudom also discloses that the alloy can include one or more of ten other elements including copper in addition to nickel in the alloy. Thus, AbuJudom furnishes the requisite suggestion to use another metal, including copper in place of a portion of the nickel in a hafnium, titanium and nickel alloy to form a quaternary (nickel, copper, titanium and hafnium) alloy with a reasonable expectation of success in so doing. See, e.g., column 3, line 65 through column 4, line 41 of AbuJudom wherein in addition to Ti and Hf, the use of nickel in combination with one or more other recited elements, including copper, is described as an option for use in the high temperature shape memory alloy.

As pointed out by the examiner (answer, page 6), Melton establishes the result effectiveness of copper addition in amounts overlapping the claimed range of addition as illustrated in Figure 2 of that patent. Given those teachings of Melton coupled with AbuJudom's disclosure as discussed above, we determine that it would have been prima facie obvious to one of ordinary skill in the art to arrive at a workable alloy including copper in amounts that would furnish a high temperature shape memory alloy of suitable properties useful for a variety of applications with a reasonable expectation of success and, in so doing, arrive at a Ni, Ti, Cu, Hf containing alloy with a composition within the ranges, as recited in representative claim 1.¹ See In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936-37 (Fed. Cir. 1990) (the determination of workable or even optimum values for result effective variables would be within the ambit of one of ordinary skill in the art); See also In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980).

As for the claimed "thin film" requirement, we agree with the examiner that fabricating the shape memory alloy of AbuJudom

¹ We observe that AbuJudom refers to U. S. Patent No. 4,144,057 (Melton) at column 2, lines 4-19 and reasonably suggests Hf addition as an improvement to such a Ni, Cu, Ti alloy as generally discussed at columns 3 through 6 of AbuJudom.

into a thin film would have been prima facie obvious to one of ordinary skill in the art. This is so because AbuJdom (column 4, lines 32-37 discloses forming articles, such as actuators from the shape memory alloy and, as taught by Johnson (see, e.g. column 4, lines 26-33 of Johnson), a thin film construction is known to be suitable for such actuators.

In light of the above and for reasons stated by the examiner in the answer, appellants' argument asserting a lack of both a suggestion and an expectation of success in fashioning a Ni, Cu, Ti, Hf thin film alloy based on the applied references' teachings is not persuasive of unobviousness. Appellants' arguments concerning the lack of predictability of adding copper to a Ni, Ti, Hf alloy are undercut by the express teachings of AbuJdom with respect to adding copper to replace some of the nickel in such a Ni, Ti, Hf alloy coupled with the teachings of Melton with respect to the effects of the addition of copper to a similar alloy, a teaching which AbuJdom referred to at column 2 of the patent. In other words, AbuJdom provides the teaching that suggests that adding copper to the Ni, Ti, Hf alloy would be expected to yield a functional shape memory alloy product that has a transition temperature of 80°C or more since AbuJdom teaches that copper addition is consistent with that objective.

While Melton may not expressly disclose a copper containing alloy having such a property as argued by appellants, that argument misses the mark since AbuJudom, not Melton, teaches the combination of Ni, Ti, Cu and Hf in forming the alloy while requiring that the M_s is at least 80°C.

In reaching the conclusion that the herein claimed subject matter is prima facie obvious over the teachings of the applied references, we also note that the prior art references in question need not provide all of appellants' reasons to establish a prima facie case of obviousness. See In re Kemps, 97 F.3d 1427, 1430, 40 USPQ2d 1309, 1311 (Fed. Cir. 1996) (the motivation to combine features need not be identical to that of appellant to establish a prima facie case of obviousness).

Furthermore, to the extent appellants may have recognized another potential advantage or property of the claimed alloy that would have been obtained by otherwise following the teachings of the prior art, that recognition does not necessarily form a basis for patentability. See In re Woodruff, 919 F.2d 1575, 1577-1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Appellants assert unexpected properties for the claimed alloy including a 40% reduction in $A_f - M_f^2$ and more favorable thermomechanical properties. To the extent that appellants are asserting that the examples furnished in the specification and the tests reported establish unexpected results for the claimed alloy, we note that the question as to whether unexpected advantages have been demonstrated is a factual question. In re Johnson, 747 F.2d 1456, 1460, 223 USPQ 1260, 1263 (Fed. Cir. 1984). Thus, it is incumbent upon appellants to supply the factual basis to rebut the prima facie case of obviousness established by the examiner. See, e.g., In re Klosak, 455 F.2d 1077, 1080, 173 USPQ 14, 16 (CCPA 1972).

Appellants, however, do not provide an adequate explanation regarding any factual showing in the specification, that is referred to in the brief, to support a conclusion of unexpected advantages.

In particular, appellants have not furnished test results that are reasonably commensurate in scope with the here claimed invention. We note that representative claim 1 is not limited to

² "[T]he difference between the temperature at which the austenite transformation is complete minus the temperature at which the martensite temperature is complete" (brief, page 12).

the specific alloy film compositions of the specification examples, including the specific sputter deposition methods of preparing same, as outlined in the examples of the specification. In this regard, we note, for example, that the film compositions according to appellants' invention reported in Table B at page 7 of the specification include either 9.6 % Cu and 17.8 % Hf or 6.5 % Cu and 18.3 % Hf. Representative claim 1 does not require any particular amount of Hf besides the limitation that the amount of Ti plus Hf is between 50-55%. The examples of Table B wherein the tested alloy Hf content is either 17.8 % or 18.3 % is clearly not commensurate with the claimed amounts of Hf. Similarly, appellants have not established how a test of an alloy including 6.5% Cu % would predict a result of an alloy including only 2% Cu as is within the scope of the representative claim 1. Thus, it is apparent that appellants' evidence is considerably more narrow in scope than the representative appealed claim 1. See In re Dill, 604 F.2d 1356, 1361, 202 USPQ 805, 808 (CCPA 1979).

Moreover, appellants simply have not shown that the example prepared for comparison, a film composition including 17.6 % Hf (Table B) using the specified sputter deposition method reported in Example 1 represents the closest prior art. Hence, we are not satisfied that the evidence of record that is offered

demonstrates results that are truly unexpected and commensurate in scope with the claims. Nor have appellants satisfied their burden of explaining how the results reported for those limited examples presented can be extrapolated therefrom so as to be reasonably guaranteed as attainable through practicing the invention as broadly claimed.

Having reconsidered all of the evidence of record proffered by the examiner and appellants, we have determined that the evidence of obviousness, on balance, outweighs the evidence of nonobviousness. Hence, we conclude that the claimed subject matter as a whole would have been obvious to one of ordinary skill in the art. Accordingly, we affirm the examiner's § 103(a) rejection.

CONCLUSION

The decision of the examiner to reject claims 1-6, 12 and 13 under 35 U.S.C. § 103(a) as being unpatentable over AbuJudom in view of Melton and Johnson is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

CHUNG K. PAK)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
PETER F. KRATZ)	APPEALS
Administrative Patent Judge)	AND
)	INTERFERENCES
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PFK/sld

Appeal No. 2004-1032
Application No. 09/835,510

Page 11

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