

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

**UNITED STATES PATENT AND TRADEMARK OFFICE**

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

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Ex parte FRANZ DOBESBERGER, HERBERT FLANKL,  
DIETMAR LEITIMEIER, and ALOIS BIRGMANN

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Appeal No. 2006-0010  
Application No. 10/170,538

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HEARD: December 15, 2005

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Before GARRIS, WALTZ and JEFFREY T. SMITH, Administrative Patent Judges.  
JEFFREY T. SMITH, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 21 to 68.<sup>1</sup> We have jurisdiction under 35 U.S.C. ' 134.

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<sup>1</sup>According to the Examiner, Answer page 2, the subject matter of claims 59 and 63 are objected to as being dependent upon a rejected base claim. However, these claims have been included in a ' 103 rejection.

### BACKGROUND

The present invention relates to a foamed metal melt having gas bubbles therein, the process of making a foamed metal melt and products formed from a foamed metal melt. The invention also relates to a device for blowing gas into a foamable metal melt.

Some embodiments of the invention specify that the diameter of a largest bubble of gas bubbles in the metal melt is less than 2.5 times a diameter of a smallest bubble of the gas bubbles. (Brief, pp. 6-9). Representative claims 21, 39, 65 and 68 appear below:

21. A device for blowing gas into a foamable metal melt and comprising at least one gas feeding pipe that projects into the metal melt, said feeding pipe having a gas outlet end with a gas outlet opening and a pipe face, wherein the gas outlet opening has a cross section of 0.006 to 0.2 mm<sup>2</sup> and the pipe face has an area of less than 4.0 mm<sup>2</sup>.

39. A process for producing a foamed metal melt by blowing gas into a metal melt through at least one gas outlet, wherein a size of individual gas bubbles and a size uniformity thereof is controlled by a geometric design of the gas outlet and by adjusting gas inflow parameters.

65. A foamed metal melt comprising a metal melt having gas bubbles therein, wherein a diameter of a largest bubble of said gas bubbles is less than 2.5 times a diameter of a smallest bubble of said gas bubbles.

68. A metal foam part comprising a metal matrix with pores evenly distributed therein, wherein the metal matrix has solid particles embedded therein, the pores are closed and have at least one of an essentially spherical and an essentially ellipsoid shape, respectively largest dimensions of said pores show a monomodal distribution, and inner wall surfaces of said pores comprise at least in part oxidized metal matrix.

The Examiner cited the following references in rejecting the appealed claims:

Jin et al. (Jin >358)	4,973,358	Nov. 27, 1990
Jin et al. (Jin >324)	5,221,324	Jun. 22, 1993
Kenny et al. (Kenny)	5,281,251	Jan. 25, 1994
Sang et al. (Sang)	5,334,236	Aug. 2, 1994

The Examiner entered the following rejections (Final Rejection, pp. 2-6):

Claims 64-68 stand rejected under 35 U.S.C. ' 102(b) as anticipated by Kenny.

Claims 64-68 stand rejected under 35 U.S.C. ' 102(b) as anticipated by  
Jin >324.

Claims 64-68 stand rejected under 35 U.S.C. ' 102(b) as anticipated by  
Jin >358.

Claims 21-58 and 60-62 stand rejected under 35 U.S.C. ' 103(a) as obvious  
over Sang.<sup>2</sup>

Claims 21-63 stand rejected under 35 U.S.C. ' 103(a) as obvious over  
Jin >358.<sup>3</sup>

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<sup>2</sup> The Examiner has withdrawn the rejection of claims 59 and 63 over Sang. (Answer, pp. 11-12).

<sup>3</sup> The Examiner in the Answer page 5 does not include all of the claims in the stated rejection. However, the Examiner provides argument regarding all of the claims 21-63 on page 14-16 of the Answer. The Appellants have presented argument for all of the claims on pages 45-72 of the Brief and pages 12-14 of the Reply Brief.

Rather than reiterate the conflicting viewpoints advanced by the Examiner and the Appellants regarding the above-noted rejections, we make reference to the Answer (mailed February 23, 2005) for the Examiner's reasoning in support of the rejections, and to the Brief (filed December 27, 2004) and the Reply Brief (filed April 25, 2005) for the Appellants' arguments there against.

We reverse the ' 102 rejections of claims 65, 67 and 68. We reverse the ' 103 rejection over Sang and the ' 103 rejection of claims 33-36, 59 and 63 over Jin >358. We affirm the ' 102 rejections of claims 64 and 66. We also affirm the ' 103 rejection of claims 21-32, 37, 39-58 and 60-62 over Jin >358. Our reasons follow.

### OPINION

#### **Rejections under ' 102**

The Examiner has rejected claims 64-68 under 35 U.S.C. ' 102(b) as anticipated by the Kenny, Jin >324 and Jin >358 references. We reverse the ' 102 rejections of claims 65, 67 and 68. We affirm the ' 102 rejections of claims 64 and 66.

The Examiner's position is that Kenny, Jin >324 and Jin >358 each anticipates the subject matter of claims 64 to 68. (Answer, pp. 3-4). ΔTo anticipate a claim, a prior art reference must disclose every limitation of the claimed invention, either explicitly or inherently.Ⓜ *In re Schreiber*, 128 F.3d 1473, 1477, 44 USPQ2d 1429, 1431 (Fed. Cir.

1997); *accord Glaxo Inc. v. Novopharm Ltd.*, 52 F.3d 1043, 1047, 34 USPQ2d 1565, 1567 (Fed. Cir. 1995).

The subject matter of claim 64 is directed to a foamed metal melt. The subject matter of claim 66 is directed to a metal foam part made from the foamed metal melt of claim 64.

We start with the claim language. *Gechter v. Davidson*, 116 F.3d 1454, 1457, 43 USPQ2d 1030, 1032, (Fed. Cir. 1997); *In re Paulsen*, 30 F.3d 1475, 1479, 31 USPQ2d 1671, 1674 (Fed. Cir. 1994). In proceedings before the U.S. Patent and Trademark Office (PTO), claims must be interpreted by giving words their broadest reasonable meanings in their ordinary usage, taking into account the written description found in the specification. *In re Morris*, 127 F.3d 1048, 1054, 44 USPQ2d 1023, 1027 (Fed. Cir. 1997)("[T]he PTO applies to the verbiage of the proposed claims the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the applicant's specification."); *In re Zletz*, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989)("During patent examination the pending claims must be interpreted as broadly as their terms reasonably allow.").

Applying these principles, we note that appealed claim 64 recites: a foamed metal melt obtainable by the process of claim 37. We interpret the “obtainable” language to mean capable of being obtained.

The Examiner asserts that the Kenny, Jin >324 and Jin >358 references all disclose foamed metal melt products with closed uniform pore sizes. The Examiner asserts that each of these references disclose all of the property limitations specified in the claims. The Examiner further asserts that the claims are drafted in a “product-by-process” format. (Answer, pp. 3-4).

Appellants argue that the Kenny, Jin >324 and Jin >358 references each disclose conventional means for blowing gas into a metal melt and do not specify the characteristics of the device of claim 21 such as the design of the gas outlet opening. (Brief, pp. 14,19-20, and 25-26). Appellants also argue that the device of claim 21 promotes the formation of bubbles with a narrow size distribution and that the references disclose metal melts, having a variety of large and small pore sizes, which are not the same or likely to be the same as the foamed metal melt produced by the device of claim 21. (Brief, pp. 14-15, 20-21, and 25-26).

Appellants are free to recite features of a product structurally, functionally or by describing the production of the product. However, when describing the invention, the inventor must describe the invention adequately and specifically to avoid the prior art. In the present case, the Kenny, Jin >324 and Jin >358 references all disclose foamed

metal melt products. The Appellants have failed to specify the structural characteristic of the claimed foam product. The Appellants instead rely on the description of the product as obtainable from the device described in claim 21.<sup>4</sup> Appellants argue that the cited references disclose metal melts that have a variety of large and small pore sizes. The claimed invention does not specify the conditions of operation of the device such that only one type of product is produced. A person of ordinary skill in the art would have recognized that several parameters, including gas flow, could have an effect on the resulting product. (Note the cited references). Appellants also acknowledge that the flow rate has an effect on the resulting product. (Specification, p. 5). The operation of the device described by claim 21 wherein the flow rate of the gas is varied would produce a product that has a variety of pore sizes. Appellants assert that the foam of the cited prior art has a variety of pore sizes. Appellants have not directed us to evidence that indicates that the foamed metal melt products of the cited references are not capable of being obtained, i.e., obtainable, by operation of the device of claim 21 utilizing varied inflow parameters of the gas. The rejection of claims 64 and 66 is thus affirmed.

Claims 65 and 67 require the foamed metal melt to have gas bubbles wherein the diameter of a largest bubble is less than 2.5 times a diameter of a smallest bubble.

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<sup>4</sup> It is a well known proposition that process steps in a product claim are limiting to the extent they further define the structure of the product. *In re Thorpe*, 777 F.2d 695, 697, 227 USPQ 964, 965-966 (Fed. Cir. 1985).

The Examiner has not identified portions of the Kenny, Jin >324 and Jin >358 references which disclose this condition. The rejections of these claims are reversed.

Claim 68 is directed to metal foam part comprising a metal matrix having pores evenly distributed therein. The claim specifies that the pores are closed and have at least one of an essentially spherical and an essentially ellipsoid shape and the largest dimensions of the pores show a monomodal distribution. The claim further specifies that the inner wall surfaces of said pores comprise at least in part oxidized metal matrix.

The portions of the Kenny and the Jin references identified by the Examiner for describing the features of the claimed invention are incorrect. While the references disclose the use of metal oxides in the formation of the pores of the metal melt, the references do not disclose the shape of the pores and that the largest dimensions of the pores show a monomodal distribution. The disclosure in the references that the pores have uniform size does not necessarily indicate the shape of the pores or the distribution thereof. The rejections of claim 68 over Kenny, Jin >324 and Jin >358 are reversed.

#### **The Rejection under ' 103 over Sang**

Claims 21-58 and 60-62 stand rejected under 35 U.S.C. 103(a) as obvious over Sang. (Final Rejection, pp. 3-4). We reverse.

According to the Examiner, Sang teaches a method and device for forming a metal foam including introducing gas by means of an oscillating pipe. The Examiner

asserts that Sang shows all the aspects of the rejected claims "except the specifically recited gas device configuration, specifically the instantly recited outlet opening and pipe face sizes or configurations." (Answer, p. 4). The Examiner asserts that "absent any demonstrated new or unexpected results arising therefrom, motivation to alter the shape or configuration of the pipe (17) of Sang et al, without materially altering the operation of the pipe (17), would have been a modification obvious to one of ordinary skill in the art at the time the invention was made." (Answer, p. 5).

Regarding claims 29-32 and 36, the Examiner asserts that motivation to multiply the numbers of a component shown singly in the prior art (i.e., the gas pipes) in order to produce a multiplied effect, would have been a modification obvious to one of ordinary skill in the art at the time the invention was made. Specifically, the Examiner states "[i]n order to produce a larger quantity of bubbles, motivation to employ 2 or 3 pipes, rather than the single pipe shown by either of Sang et al . . . , would have been a modification obvious to one of ordinary skill in the art at the time the invention was made." (Answer, p. 6).

Appellants argue that Sang does not provide any motivation and expectation of success for modifying the gas outlet openings of the devices disclosed therein, let alone in the manner as recited in the rejected claims. As to claims 21 and 39, the independent claims, Appellants argue that none of the claimed features are taught or suggested by Sang. Regarding claims 29-32 and 36, Appellants argue that Sang does

not mention the desirability or possibility of providing more than one gas feeding unit in the various embodiments illustrated in the Figures thereof. Appellants further argue that there are a number of ways to increase the quantity of gas bubbles in the embodiments shown in Sang which are not limited to increasing the number of gas feeding units. (Brief, pp. 62-67). Thus, Appellants conclude that the Examiner has failed to establish a *prima facie* case of obviousness of the subject matter.

We agree with Appellants. The mere fact that the prior art could be modified as proposed by the Examiner is not sufficient to establish a *prima facie* case of obviousness. See *In re Fritch*, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992). The Examiner must explain why the prior art would have suggested to one of ordinary skill in the art the desirability of the modification. See *Fritch*, 972 F.2d at 1266, 23 USPQ2d at 1783-84. The Examiner has not adequately explained how the general teaching of uniform pore size suggests the modifications required to achieve the invention of the independent claims. Moreover, the Examiner has not explained where in the prior art it is recognized the results that would have been achieved by altering the shape or configuration of the pipe of Sang. The Examiner has not provided any evidentiary support on this record for this position. See *In re Lee*, 277 F.3d 1338, 1343, 61 USPQ2d 1430, 1434 (Fed. Cir. 2002)("This factual question of motivation is material to patentability, and could not be resolved on subjective belief and unknown authority."). Furthermore, the Examiner has not explained how a person of ordinary skill in the art

would focus on the geometric design of the gas outlets of the devices disclosed therein to determine the appropriate shape or configuration to render the claimed subject matter obvious. The rejection of the claims under ' 103 over Sang is reversed.

**The Rejection under ' 103 over Jin >358**

Claims 21-63 stand rejected under 35 U.S.C. 103(a) as obvious over Jin >358. The rejection of claims 21-32, 37, 39-58 and 60-62 over Jin >358 is affirmed. The rejection of claims 33-36, 38, 59 and 63 is reversed.

Regarding independent claim 21 and dependent claim 37, the Examiner asserts Jin >358 teaches a method and device for forming a metal foam including introducing gas by means of an oscillating pipe. The Examiner asserts that Jin >358 shows all the aspects of the rejected claims except the specifically recited gas device configuration, specifically the instantly recited outlet opening and pipe face sizes or configurations. (Answer, p. 5). Jin >358 states A[t]he cell size of the foam being formed is controlled by adjusting the air flow rate, the number of nozzles, the nozzle size, the nozzle shape and the impeller rotational speed. (Col. 3, ll. 17-21). The Examiner asserts that absent any demonstrated new or unexpected results arising therefrom, motivation to alter the shape or configuration of the pipe (16) of Jin et al =358, without materially altering the operation of the pipe (16), would have been a modification obvious to one of ordinary skill in the art at the time the invention was made. (Answer, p. 6).

Regarding claims 29-32 and 36, the Examiner asserts that Jin et al '358 shows all aspects of the above claims except the use of more than a single pipe. The Examiner asserts that motivation to multiply the numbers of a component shown singly in the prior art (i.e., the gas pipes) in order to produce a multiplied effect, would have been a modification obvious to one of ordinary skill in the art at the time the invention was made. Specifically, the Examiner states  $\Delta$ [i]n order to produce a larger quantity of bubbles, motivation to employ 2 or 3 pipes, rather than the single pipe shown by . . . . Jin et al'358, would have been a modification obvious to one of ordinary skill in the art at the time the invention was made. (Answer, p. 6).

Appellants argue that  $\Delta$ this rejection is without merit already for the reason that the system of Jin'358 does not operate in essentially the same manner and with essentially the same result as the device of the present invention. (Answer, p. 6) Appellants argue that the operation of the device of the present invention and the device of Jin'358 is based on fundamentally different principles and the results thereof (foamed metal foams) are different as well. In particular, Appellants argue that the gas bubbles of Jin >358 are produced by a rotatable air injection shaft 15 which extends down into the vessel at an angle to the horizontal. (Brief, pp. 47-48).

Appellants= arguments are not persuasive. It is not disputed that Jin >358 discloses a device for blowing gas into a foamable metal melt comprising at least one gas feeding pipe that projects into the metal melt. The device recited in the claims does

not exclude the movement of the gas outlet opening or the use of a rotatable air injection shaft. Further, we note that Appellants have not presented convincing evidence that establishes that the apparatus of Jin >358 produces foamed products which are different from the products produce by the claimed invention.

Appellants argue that A[t]he desired operation of the pipe of Jin'358 apparently does not rely on the size of any pipe opening and/or pipe face (or a nozzle). Rather, in order to be able to form gas bubbles (pores) of "uniform" size in the metal melt, the system of Jin'358 must comprise gas outlet openings (nozzles) which move (rapidly) inside the metal melt. (Brief, p. 48). Appellants further argue Athat Jin'358 does not even disclose a gas feeding pipe with a gas outlet opening in a strict sense, but only an impeller with gas nozzles therein. At any rate, Jin'358 does not contain any indication that modifying the geometry of the impeller nozzles of the system described therein will have any effect, let alone an advantageous effect. (Brief, pp. 49-50).

These arguments are unpersuasive. Jin >358 recognizes that cell size of the foam being formed is controlled by adjusting various parameters. Specifically, Jin >358 expressly states that the nozzle shape, i.e., size and configuration, affects the cell size of the foam being formed. (Col. 3, ll. 17-21). Thus, Jin >358 is suggestive of adjusting the nozzle configuration so as to achieve the proper cell size of the foam being formed. This accords with the rule that discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art. *In re Boesch*, 617

F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980); *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977); *In re Aller*, 42 CCPA 824, 220 F.2d 454, 105 USPQ 233 (1955). Accordingly, we conclude that a *prima facie* case of obviousness has been established.

Regarding claims 24, 25 and 41-44, Appellants argue that Jin '358 does not teach or suggest that it is advantageous to control the distance between a gas outlet opening of a gas feeding pipe and the surface of the metal melt or establish the relationship of the distance between the gas outlet opening and the surface of the metal melt for determining the dimension of the gas outlet opening. (Brief, pp. 53 and 58-60).

Regarding claims 26-28 and 40, Appellants argue that the claim specifies the shape and arrangement of the gas outlet end of the gas feeding pipe of the device. (Brief, pp. 53-54 and 57-58).

Jin >358 describe an apparatus where the gas outlet opening of a gas feeding pipe is inserted below the surface of the metal melt. As discussed above, Jin >358 also recognizes the nozzle size and configuration of the gas outlet opening can be varied. Appellants' arguments are unpersuasive because they have failed to establish the criticality of the recited nozzle shape and configuration.

Regarding claims 39, 45, 47-58 and 60-62, Appellants argue Jin '358 fails to teach or suggest that the size of the individual gas bubbles and the size uniformity thereof can or should be controlled, at least in part, by the geometric design of a gas outlet. Appellants further argue that Jin >358 does not provide motivation to use the

geometric design of a gas outlet as a tool for controlling the cell size/cell size distribution in the foam of Jin '358. (Brief, pp. 56-57).

These argument are not persuasive. As stated above, Jin >358 recognizes that cell size of the foam being formed is controlled by adjusting various parameters. Jin >358 expressly states that the nozzle shape, i.e., size and configuration, affects the cell size of the foam being formed. (Col. 3, ll. 17-21). Thus, Jin >358 is suggestive of adjusting the nozzle configuration so as to achieve the proper cell size of the foam being formed.

Appellants= arguments regarding claim 46 are not persuasive. (Brief, pp. 60-61). Jin >358 is suggestive of adjusting the flow rate of the gas so as to achieve the proper cell size of the foam being formed. (Col. 3, ll. 17-21).

Appellants= arguments appearing in the Reply Brief have been fully considered and addressed above. The arguments presented reiterate the Appellants= position stated in the extensive arguments of the Brief.

Claims 33-36 describe the gas feeding pipe as comprising a ceramic material. Claim 38 describes a process for producing a foam utilizing the device of claim 35. Claims 59 and 63 describe the distance the pipe is inserted for blowing the gas into the metal melt as corresponding to the stated formula. The Examiner has failed to identify the portion of the Jin >358 reference that discloses these features. The Examiner has also failed to identify where in the prior art it is known to use ceramic material in the gas

feeding pipe or why it would have been obvious to insert the pipe into the metal melt a distance which would correspond to the specified formula. Thus, the Examiner has failed to establish a *prima facie* case. The rejection of claims 33-36, 38, 59 and 63 over Jin >358 is reversed.

#### CONCLUSION

The rejections under ' 102 of claims 65, 67 and 68 over the Kenny, Jin >324 and Jin >358 references are reversed. The ' 102 rejections of claims 64 and 66 over the Kenny, Jin >324 and Jin >358 references are affirmed. The ' 103 rejection over Sang and the ' 103 rejection of claims 33-36, 38, 59 and 63 over Jin >358 are reversed. The ' 103 rejection of claims 21-32, 37, 39-58 and 60-62 over Jin >358 is affirmed.

TIME FOR TAKING ACTION

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR ' 1.136(a)(1)(iv).

**AFFIRMED-IN-PART**

BRADLEY R. GARRIS  
**Administrative Patent Judge**

THOMAS A. WALTZ  
**Administrative Patent Judge**

JEFFREY T. SMITH  
**Administrative Patent Judge**

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