

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

Paper No. 53

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte MICHIO HASEGAWA  
and MASASHI SAHASHI

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Appeal No. 1997-2046  
Application No. 08/059,350

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HEARD: July 12, 2000

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Before HAIRSTON, BARRETT, and BARRY, Administrative Patent Judges.

BARRY, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the rejection of claims 40-63 and 65-85. We reverse.

BACKGROUND

The invention at issue in this appeal relates to an inductor used as a choke coil on the output side of a direct current (DC)-to-DC converter. Although the use of a planar

inductor for such a choke coil achieves miniaturization, it suffers several drawbacks. Because the inductor uses an amorphous alloy ribbon having a high permeability as a ferromagnetic ribbon, the inadequate magnetic characteristics of the ribbon produce poor DC superposition characteristics. In turn, the poor DC superposition characteristics reduce inductance, making control difficult and lowering the efficiency of a DC-to-DC converter to which the planar inductor is applied. Even if the DC superposition characteristics can be improved, a high-frequency loss of the ferromagnetic ribbon limits the efficiency of the applied DC-to-DC converter.

In practice, the planar inductor is coated with a mold resin. If the amorphous alloy ribbon has a positive saturation magnetostriction, when the surface of the planar inductor is coated with a liquid mold resin and the resin is hardened, contraction of the mold resin applies a compressive stress to the ferromagnetic ribbon. An inverse magnetostrictive effect decreases effective permeability, thus reducing an inductance.

The inventive planar inductor has a spiral coil, insulating layers stacked on both surfaces of the spiral coil, and ferromagnetic layers stacked on the insulating layers. Each ferromagnetic layer has a saturation magnetization ( $4B_{ms}$ ) of at least 10 kG and a thickness no greater than 100 Fm. DC superposition characteristics are improved such that the inventive planar inductor can be effectively applied to a DC-to-DC converter. Each ferromagnetic layer is two dimensionally divided into a plurality of portions. Such division decreases high-frequency, thereby improving the efficiency of the applied DC-to-DC converter.

When the inventive planar inductor is used in practice, a relaxation layer for contraction of a mold resin is formed on a surface of each ferromagnetic layer. Such formation relaxes contraction generated when the mold resin is hardened and contracted. Such relaxation prevents transmission of the contraction to each ferromagnetic layer, which prevents reduction in inductance due to an inverse magnetostrictive effect.

Claim 40, which is representative for our purposes,  
follows:

40. A planar inductor, comprising:

a planar inductance element comprising a coil  
having a plurality of windings, the plurality of  
windings all extending in the same plane; and

at least one ferromagnetic layer stacked on said  
planar inductance element;

wherein said at least one ferromagnetic layer  
comprises a plurality of ferromagnetic sub-layers  
stacked directly upon one another with no intervening  
structure between the plurality of sub-layers.

The references relied on in rejecting the claims follow:

Takahashi et al. 1982 (Takahashi)	4,322,698	Mar. 30,
Hasegawa et al. (Hasegawa)	4,959,631 (filed Sep. 28, 1988)	Sep. 25, 1990
Yoshizawa (European Patent Application)	0 271 657	Jun. 22, 1988

Soohee, Magnetic Thin Film Inductors for Integrated  
Circuit Applications," IEEE Transactions on  
Magnetics, 1803-06 (Nov. 1979)

Claims 40, 46-48, 54-56, 73, 75, and 80 stand rejected  
under

35 U.S.C. § 103 as obvious over Hasegawa in view of Takahashi. Claims 41-45, 49-53, 57-63, 65-72, 74, 76-79, and 81-85 stand rejected under 35 U.S.C. § 103 as obvious over Hasegawa in view of Takahashi further in view of Yoshizawa or Soohoo. Rather than repeat the arguments of the appellants or examiner in toto, we refer the reader to the briefs and answer for the respective details thereof.

#### OPINION

In reaching our decision in this appeal, we considered the subject matter on appeal and the rejection advanced by the examiner. Furthermore, we duly considered the arguments and evidence of the appellants and examiner. After considering the totality of the record, we are persuaded that the examiner erred in rejecting claims 40-63 and 65-85. Accordingly, we reverse.

We begin by noting the following principles from In re Rijckaert, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993).

In rejecting claims under 35 U.S.C. Section 103, the examiner bears the initial burden of presenting a prima facie case of obviousness. In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).... "A prima facie case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art." In re Bell, 991 F.2d 781, 782, 26 USPQ2d 1529, 1531 (Fed. Cir. 1993) (quoting In re Rinehart, 531 F.2d 1048, 1051, 189 USPQ 143, 147 (CCPA 1976)). If the examiner fails to establish a prima facie case, the rejection is improper and will be overturned. In re Fine, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988).

With these principles in mind, we address the examiner's rejection of and the appellants' arguments about claims 40-55, 65-75, and 78-85; claim 56; and claims 57-62 and 76. We first address claims 40-55, 65-75, and 78-85.

Claims 40-55, 63, 65-75, and 77-85

The examiner concludes, "[s]ince Takahashi et al have stacked ferromagnetic sub-layers on each side of their inductor coil it would have been obvious for the coil inductor of Hasegawa et al to have plural layers or sub-lays for layers 2a and 2b in Figs. 1A and 1B as taught by Takahashi et al." (Examiner's Answer at 3.) The appellants argue, "the Takahashi et al. patent (1) does not disclose a plurality of

ferromagnetic sub-layers stacked directly upon one another  
...." (Appeal Br. at 22.)

Claims 40-52 and 75 each specifies in pertinent part the following limitations: "at least one ferromagnetic layer stacked on said planar inductance element; wherein said at least one ferromagnetic layer comprises a plurality of ferromagnetic sub-layers stacked directly upon one another with no intervening structure between the plurality of sub-layers." Claim 53 specifies in pertinent part the following limitations: "ferromagnetic layers, each ferromagnetic layer comprising a plurality of ferromagnetic ribbon which are sandwiched together ...." Claim 54 specifies in pertinent part the following limitations: "a first ferromagnetic layer; ... wherein the first ferromagnetic layer comprises a plurality of ferromagnetic sub-layers that are stacked upon one another; and wherein there are no coils between the stacked plurality of ferromagnetic sub-layers." Claim 55 specifies in pertinent part the following limitations: "a first ferromagnetic layer; ... wherein the first ferromagnetic layer comprises a plurality of a sub-layers that are stacked

upon one another; and wherein all coils of the planar inductor are disposed between the first and second ferromagnetic layers."

Claims 63 and 77 each specifies in pertinent part the following limitations: "ferromagnetic layers, each of said ferromagnetic layers comprising a plurality of ferromagnetic ribbons which are sandwiched together ...." Claims 65-68 and 78 each specifies in pertinent part the following limitations: "ferromagnetic layers each including a plurality of ferromagnetic ribbons ...." Claims 69-72 and 79 each specifies in pertinent part the following limitations: "at least one ferromagnetic layer is formed from a plurality of sub-layers that are stacked upon one another ...."

Claims 73, 74, and 80 each specifies in pertinent part the following limitations: "at least one ferromagnetic layer ...; wherein said at least one ferromagnetic layer comprises a plurality of ferromagnetic sub-layers which are stacked upon one another and form said ferromagnetic layer and have no electrically conductive material between them." Claims 81-85

each specifies in pertinent part the following limitations:

"ferromagnetic layers each including a plurality of ferromagnetic ribbons ...." Accordingly, the limitations of claims 40-55, 63, 65-75, and 77-85 each require at least one ferromagnetic layer comprising plural ferromagnetic sub-layers or ribbons.

The examiner fails to show a suggestion of the limitations in the prior art. He agrees with the appellants that "the instant application is terminally disclaimed over the Hasegawa et al patent, and therefore, 'the Hasegawa et al per se is not prior art.'" (Examiner's Answer at 3.) Nevertheless, the appellants admit, "the only subject matter that is available based upon the admissions in the Hasegawa et al. patent, of what constitutes the prior art relative to the Hasegawa et al. patent, is what the Hasegawa et al. patent admits is known prior art." (Appeal Br. at 11.) At oral hearing, the appellants' representative agreed that this admission is constituted by disclosure described in lines 8-24 of column 1 of Hasegawa and shown in figures 1A and 1B of the reference. Although the disclosure teaches two ferromagnetic

layers, viz., "ferromagnetic ribbons **2a** and **2b**," col. 1, l. 10, there is no indication that either ribbon comprises plural ferromagnetic sub-layers or ribbons. To the contrary, Figure 1B depicts ferromagnetic ribbons 2a and 2b as undivided.

Faced with this omission, the examiner alleges "Takahashi et al have stacked ferromagnetic sub-layers on each side of their inductor coil ...." (Examiner's Answer at 3.) The reference, however, belies the allegation. Although Takahashi teaches magnetic material layers 1, 3, 6, 9, 12, and 14, see col. 3, l. 60 - col. 4, l. 37, there is no indication that any of the layers comprises plural ferromagnetic sub-layers or ribbons. To the contrary, Figures 1-13 depict the magnetic material layers as undivided. The examiner fails to allege, let alone show, that Yoshizawa or Soohoo cures this defect.

Because Hasegawa and Takahashi depict undivided, ferromagnetic ribbons and undivided, magnetic material layers, respectively, we are not persuaded that teachings from the prior art would have suggested the limitations of: "at least

one ferromagnetic layer stacked on said planar inductance element; wherein said at least one ferromagnetic layer comprises a plurality of ferromagnetic sub-layers stacked directly upon one another with no intervening structure between the plurality of sub-layers"; "ferromagnetic layers, each ferromagnetic layer comprising a plurality of ferromagnetic ribbon which are sandwiched together"; "a first ferromagnetic layer; ... wherein the first ferromagnetic layer comprises a plurality of ferromagnetic sub-layers that are stacked upon one another; and wherein there are no coils between the stacked plurality of ferromagnetic sub-layers"; "a first ferromagnetic layer; ... wherein the first ferromagnetic layer comprises a plurality of sub-layers that are stacked upon one another; and wherein all coils of the planar inductor are disposed between the first and second ferromagnetic layers"; "ferromagnetic layers, each of said ferromagnetic layers comprising a plurality of ferromagnetic ribbons which are sandwiched together"; "ferromagnetic layers each including a plurality of ferromagnetic ribbons"; "at least one ferromagnetic layer is formed from a plurality of sub-layers that are stacked upon one another"; "at least one

ferromagnetic layer ...; wherein said at least one ferromagnetic layer comprises a plurality of ferromagnetic sub-layers which are stacked upon one another and form said ferromagnetic layer and have no electrically conductive material between them"; or "ferromagnetic layers each including a plurality of ferromagnetic ribbons ...." The examiner fails to establish a prima facie case of obviousness. Therefore, we reverse the rejections of claims 40-55, 63, 65-75, and 77-85 under 35 U.S.C. § 103. We next address claim 56.

#### Claim 56

Recognizing that Hasegawa, Takahashi, Yoshizawa, and Soohoo fail to have suggested two-dimensional division, the examiner concludes, "[d]ividing a device into a plurality of portions ... is obvious and a matter of design choice." (Examiner's Answer at 8.) The appellants argue, "[t]he office action has not asserted that the prior art discloses or suggest a ferromagnetic layer that is two-dimensionally divided into a plurality of portions." (Appeal Br. at 34.)

Claim 56 specifies in pertinent part the following limitations: "a least one ferromagnetic layer stacked on said planar inductance element; where said ferromagnetic layer is two-dimensionally divided into a plurality of ferromagnetic portions with no intervening structures between the portion." Accordingly, the limitations require a ferromagnetic layer that is two-dimensionally divided into portions.

The examiner fails to show a suggestion of the limitations in the prior art. "Obviousness may not be established using hindsight or in view of the teachings or suggestions of the inventor." Para-Ordnance Mfg. v. SGS Importers Int'l, 73 F.3d 1085, 1087, 37 USPQ2d 1237, 1239 (Fed. Cir. 1995)(citing W.L. Gore & Assocs., Inc. v. Garlock, Inc., 721 F.2d 1540, 1551, 1553, 220 USPQ 303, 311, 312-13 (Fed. Cir. 1983)). "The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." In re Fritch, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1784 (Fed. Cir. 1992) (citing In re Gordon, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir.

1984)). "It is impermissible to use the claimed invention as an instruction manual or 'template' to piece together the teachings of the prior art so that the claimed invention is rendered obvious." In re Fritch, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1784 (Fed. Cir. 1992)(citing In re Gorman, 933 F.2d 982, 987, 18 USPQ2d 1885, 1888 (Fed. Cir. 1991)).

We also note the following principles from In re Dembiczak, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999)(exemplary citations omitted).

The range of sources available, however, does not diminish the requirement for actual evidence. That is, the showing must be clear and particular. See, e.g., C.R. Bard, 157 F.3d at 1352, 48 USPQ2d at 1232. Broad conclusory statements regarding the teaching of multiple references, standing alone, are not "evidence."

Although couched in terms of combining prior art references, the same requirement applies in the context of modifying such a reference. Here, the examiner's broad, conclusory opinion of obviousness does not meet the requirement for actual evidence.

In view of the examiner's unsubstantiated, conclusory opinion, we are not persuaded that teachings from the prior art would have suggested the limitations of "at least one ferromagnetic layer stacked on said planar inductance element; where said ferromagnetic layer is two-dimensionally divided into a plurality of ferromagnetic portions with no intervening structures between the portion." The examiner fails to establish a prima facie case of obviousness. Therefore, we reverse the rejection of claim 56 under 35 U.S.C. § 103. We next, and last, address claims 57-62 and 76.

Claims 57-62 and 76

Recognizing that Hasegawa and Takahashi fail to have suggested a saturation magnetization greater than 10 kG or a thickness less than 100 Fm, the examiner concludes, "[i]t would have obvious for Hasegawa et al. to have layers with a saturation magnetization of not less than 10KG as taught by Soohoo." (Examiner's Answer at 8.) He further concludes, "[s]ince Yoshizawa et al. ... have such layers of less than 100Fm (example 35) used for inductor coils, it would have been obvious for Hasegawa et al. to have layers of less than 100Fm

...." (Id. at 7-8.) The appellants argue that the examiner "does not even assert that those limitations are obvious to provide in the provide [sic] in the combinational [sic] structure." (Reply Br. at 16.)

``[T]he main purpose of the examination, to which every application is subjected, is to try to make sure that what each claim defines is patentable. [T]he name of the game is the claim ....'" In re Hiniker Co., 150 F.3d 1362, 1369, 47 USPQ2d 1523, 1529 (Fed. Cir. 1998) (quoting Giles S. Rich, The Extent of the Protection and Interpretation of Claims--American Perspectives, 21 Int'l Rev. Indus. Prop. & Copyright L. 497, 499, 501 (1990)). Here, claims 57-62 and 76 each specifies in pertinent part the following limitations: "[a] planar inductor having an inductance, comprising: at least one ferromagnetic layer, each ferromagnetic layer having a saturation magnetization that is greater than 10kG and a thickness of less than 100 microns ...." Accordingly, the limitations require a ferromagnetic layer of a planar inductor having a saturation magnetization greater than 10 kG and a thickness less than 100 Fm.

The examiner fails to show a suggestion of the limitations in the prior art. Although Soohoo teaches a saturation magnetization of "about  $10^4$  gauss," p. 1803, the saturation magnetization is not a property of a ferromagnetic layer of a planar inductor. To the contrary, it is a property of a magnetic core as an anisotropic Permalloy film. Id. His broad, conclusory opinion that "saturation magnetization ... [is] dictated by design requirements," (Examiner's Answer at 8), does not meet the requirement for actual evidence of obviousness.

For its part, although Yoshizawa teaches a height of 18 Fm," p. 34, the height is not a property of a ferromagnetic layer of a planar inductor. To the contrary, it is a property of a toroidal wound core. Id.

Because Soohoo only teaches a saturation magnetization of a magnetic core and Yoshizawa only teaches a toroidal wound core, we are not persuaded that teachings from the prior art would have suggested the limitations of "[a] planar inductor having an inductance, comprising: at least one ferromagnetic

layer, each ferromagnetic layer having a saturation magnetization that is greater than 10kG and a thickness of less than 100 microns ...." The examiner fails to establish a prima facie case of obviousness. Therefore, we reverse the rejection of claim 57-62 and 76 under 35 U.S.C. § 103.

#### CONCLUSION

In summary, the rejection of claims 40, 46-48, 54-56, 73, 75, and 80 under 35 U.S.C. § 103 as obvious over Hasegawa in view of Takahashi is reversed. The rejection of claims 41-45, 49-53, 57-63, 65-72, 74, 76-79, and 81-85 under 35 U.S.C. § 103 as

obvious over Hasegawa in view of Takahashi further in view of Yoshizawa or Soohoo is also reversed.

REVERSED

KENNETH W. HAIRSTON	)	
Administrative Patent Judge	)	
	)	
	)	
	)	
	)	BOARD OF PATENT
LEE E. BARRETT	)	APPEALS
Administrative Patent Judge	)	AND
	)	INTERFERENCES
	)	
	)	
	)	
LANCE LEONARD BARRY	)	
Administrative Patent Judge	)	

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