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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/904,809	01/13/2016	Salim BOUTAMI	P11433US00/BAS	4376

881 7590 09/16/2020

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ART UNIT	PAPER NUMBER
2896	

NOTIFICATION DATE	DELIVERY MODE
09/16/2020	ELECTRONIC

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte SALIM BOUTAMI, MICKAËL BRUN, PIERRE LABEYE, SERGIO NICOLETTI, and GRÉGORY MAISONS

Appeal 2019-005084
Application 14/904,809
Technology Center 2800

Before JAMES C. HOUSEL, MICHELLE N. ANKENBRAND, and JULIA HEANEY, *Administrative Patent Judges*.

ANKENBRAND, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant[1] appeals under 35 U.S.C. § 134(a) from the Examiner's decision[2] finally rejecting claims 1–20. We have jurisdiction under 35 U.S.C. § 6(b).

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[1] We use the word Appellant to refer to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies Commissariat à L'Énergie Atomique et aux Energies Alternatives as the real party in interest. Appeal Brief, filed July 16, 2018 ("Appeal Br.") 1. Appellant filed Supplemental Appeal Briefs on August 30, 2018 and November 13, 2018, in response to Notices of Defective Appeal Brief. In this decision, references to the Appeal Brief are to the Appeal Brief filed July 16, 2018.

[2] Final Action, mailed February 15, 2018 ("Final Act.").

We affirm in part.

STATEMENT OF THE CASE

Background

The subject matter on appeal "relates to an optical coupler, a component comprising such an optical coupler, a determination method, and a method for manufacturing such an optical coupler." Specification, filed January 13, 2013 ("Spec.") 2:4–6.[3] The Specification explains a need exists for structures that make it possible to guide light effectively in the field of heterogeneous integration of laser sources on an integrated optical structure. *Id.* at 2:9–13. A monolithic laser source effective on silicon does not yet exist, so laser sources generally use III-V type semiconductors on a silicon substrate. *Id.* at 2:14–23. The Specification proposes to use evanescent waves to effectively couple the laser light the laser source creates in the III-V semiconductor with a passive waveguide of the silicon guide structure. *Id.* at 2:24–26. Such a coupling requires the laser source and passive waveguide to be very close, but such close proximity is often difficult to obtain in practice because an insulating layer that protects the passive waveguide degrades the laser source. *Id.* at 3:7–12.

To that end, the Specification discloses an optical coupler in a vertical configuration that includes, among other things, a first waveguide with a first effective index and a second waveguide distinct from the first waveguide with a second effective index that is different from the first

[3] The Specification filed on January 13, 2013, does not include paragraphs or line numbers. For ease of reference, we add line numbers to the Specification.

effective index. *Id.* at 3:21–27. The second waveguide further has a patterning and a period, wherein the pattern has parameters influencing evanescent wave coupling between the first and second waveguide such that the coupling is greater than 15%. *Id.* at 3:27–4:6.

Of the appealed claims, claims 1, 15, 17, and 19 are independent. Claim 1 is representative of the subject matter on appeal, and is reproduced below.

> 1. An optical coupler in a vertical configuration, capable of working for a wavelength, wherein said optical coupler comprises:
>
> a first waveguide extending in the longitudinal direction and capable of propagating a first propagation mode of the light having a first effective index, an entry plane, and an exit plane being defined for the first waveguide,
>
> a second waveguide distinct from the first waveguide, parallel to the first waveguide, having a core and a cladding and capable of propagating a second propagation mode of the light having a second effective index, the second effective index being different from the first effective index, an entry plane, and an exit plane being defined for the second waveguide, the entry plane of the first waveguide being situated between the entry plane of the second waveguide and the exit plane of the second waveguide,
>
> the second waveguide having a patterning, the patterning having a period along the longitudinal direction below the ratio between the wavelength at which the optical coupler is capable of operating and the product of two by the second effective index, the patterning being in the form of a series of patterns, the patterns extending along a transverse direction perpendicular to the longitudinal direction, being parallel to each other and orthogonal to the general direction of the first waveguide, each pattern having parameters influencing the evanescent wave coupling between the first waveguide and the second waveguide so that the coupling is determined by a ratio

> between an intensity of an electrical field at the entry plane of the first waveguide and an intensity of an electrical field at the exit plane of the second waveguide and is greater than 15%.

Appeal Br. 20 (Claims App'x).

The References

Akiyama	US 2011/0299561 A1	Dec. 8, 2011
Faccio et al.	US 2007/0058900 A1	Mar. 15, 2007
Madsen et al.	US 6,931,180 B2	Aug. 16, 2005
Chen et al.	US 7,457,491 B2	Nov. 25, 2008

The Rejections

The Examiner maintains the following rejections on appeal:

1. Claims 1–7, 9, 11, 12, and 14–16 under 35 U.S.C. § 103 as unpatentable over Akiyama in view of Faccio;

2. Claims 8 and 10 under 35 U.S.C. § 103 as unpatentable over Akiyama in view of Faccio and Madsen; and

3. Claims 13 and 17–20 under 35 U.S.C. § 103 as unpatentable over Akiyama in view of Faccio and Chen.

Final Act. 4–16; Examiner's Answer, dated April 15, 2019 ("Ans.") 2.

OPINION

Rejection over Akiyama and Faccio

The Examiner rejects claims 1–7, 9, 11, 12, and 14–16 under 35 U.S.C. § 103 as unpatentable over Akiyama and Faccio. Final Act. 4–14. Appellant argues claims 1 and 15 as a first group, and separately argues claim 3, claim 6, and claim 12. Appeal Br. 9–15. Appellant does not present separate arguments for claims 2, 4, 5, 7, 9, 11, 14, and 16, which

depend from claim 1. Thus, those claims stand or fall with claim 1. 37 C.F.R. § 41.37(c)(1)(iv). We address the claims Appellant argues separately below.

Claims 1, 2, 4, 5, 7, 9, 11, and 14–16

Relevant to independent claims 1 and 15, the Examiner finds Akiyama discloses, among other things, a coupler in a vertically-stacked configuration that includes a first waveguide and a second waveguide with a patterning. Final Act. 4–6. The Examiner finds Akiyama does not disclose the patterning period recited in claims 1 and 15, but finds it would have been obvious to optimize this parameter in view of Faccio. *Id.* at 6. Specifically, the Examiner finds Faccio, like Akiyama, discloses a vertically-stacked coupler that includes a first waveguide and a second waveguide having a patterning. *Id.* at 6–7. The Examiner also finds Faccio discloses equations that govern the patterning period and Faccio's patterning has parameters that influence optical coupling between the first and second waveguides. *Id.* at 7–8. The Examiner concludes it would have been obvious to modify Akiyama's patterning in view of Faccio's teachings regarding patterning period. *Id.* at 7–8. The Examiner further finds Faccio teaches selecting patterning parameters so there is a "*complete power exchange*" between two waveguides. *Id.* at 10. In view of this finding, the Examiner determines that the combination of Akiyama and Faccio would result in coupling that is greater than 15%, as claims 1 and 15 require. *Id.*

Appellant contends that Akiyama's diffraction gratings 6 and 7 are not the patterning recited in claims 1 and 15 because "Applicant's specification makes it clear that the patterning is not a diffraction grating." Appeal Br. 9;

Reply Brief, filed June 17, 2019 ("Reply Br.") 1, 3. Appellant's Specification, states:

> The second waveguide 14 has a patterning 33 in the form of a series of patterns 36. The patterning 33 can also be designated using the generic term 'grating' 33. However, for clarity reasons, this term is not used in the context of this description, since the patterning 33 is **not a diffraction grating.** In particular, the patterning 33 does not serve to amplify the field in the gain medium. On the contrary, the patterning 33 makes it possible to extract light by modifying the effective index. (Emphasis added).

Appeal Br. 10 (citing Spec. 5:27–32 (emphasis added)).

Akiyama's Figure 1 is reproduced below.

FIG. 1

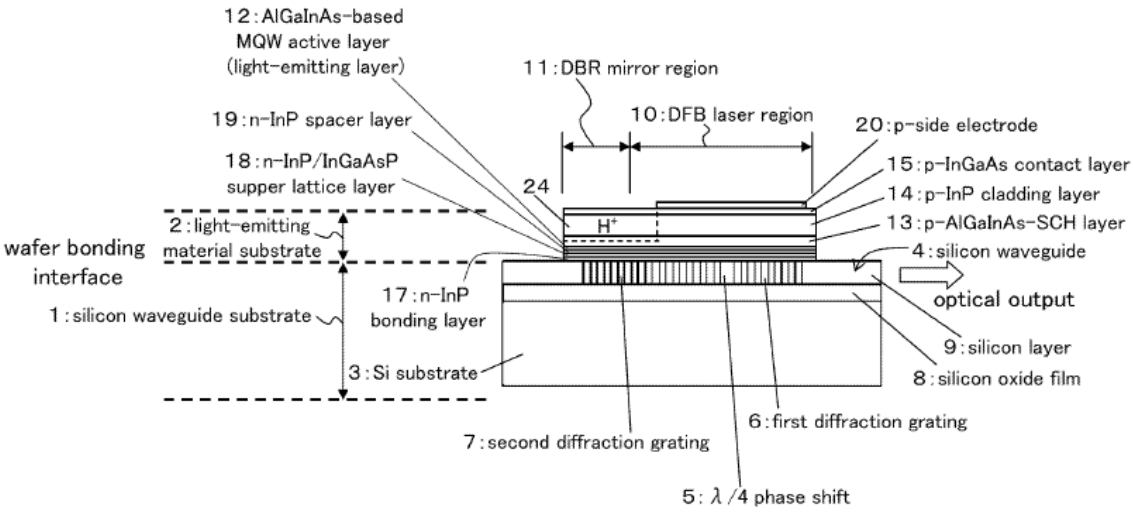

Figure 1 shows a semiconductor configuration

Figure 1 depicts silicon waveguide substrate 1 that includes silicon substrate 3, silicon waveguide 4, first diffraction grating 6, second diffraction grating 7, DFB laser region 10, and DBR mirror region 11. Akiyama ¶¶ 28, 39. The Examiner identifies DFB laser region 10 and DBR mirror region 11 as a first waveguide, silicon waveguide 4 as a second

waveguide, and first and second diffraction gratings 6 and 7 as the recited patterning. Final Act. 4–5. Therefore, Appellant is correct that Akiyama refers to structures 6 and 7 as diffraction gratings. As noted above, Appellant's Specification states "the patterning 33 is not a diffraction grating." Spec. 8:3–4.

The record, however, includes further evidence indicating that Akiyama's structures correspond to the recited patterning. Akiyama describes its laser as an "evanescent laser" and explains "light propagating through the silicon waveguide evanescently couples to the light-emitting material, thereby providing an optical gain." Akiyama ¶¶ 19, 20, 25. Thus, Akiyama discloses that its device performs evanescent coupling. *See also* Faccio ¶¶ 19, 47, 49, Fig. 2a (demonstrating that gratings were known to optically couple two waveguides).

The structure of Akiyama's gratings 6 and 7 are shown in Figure 3, which is reproduced below.

FIG. 3

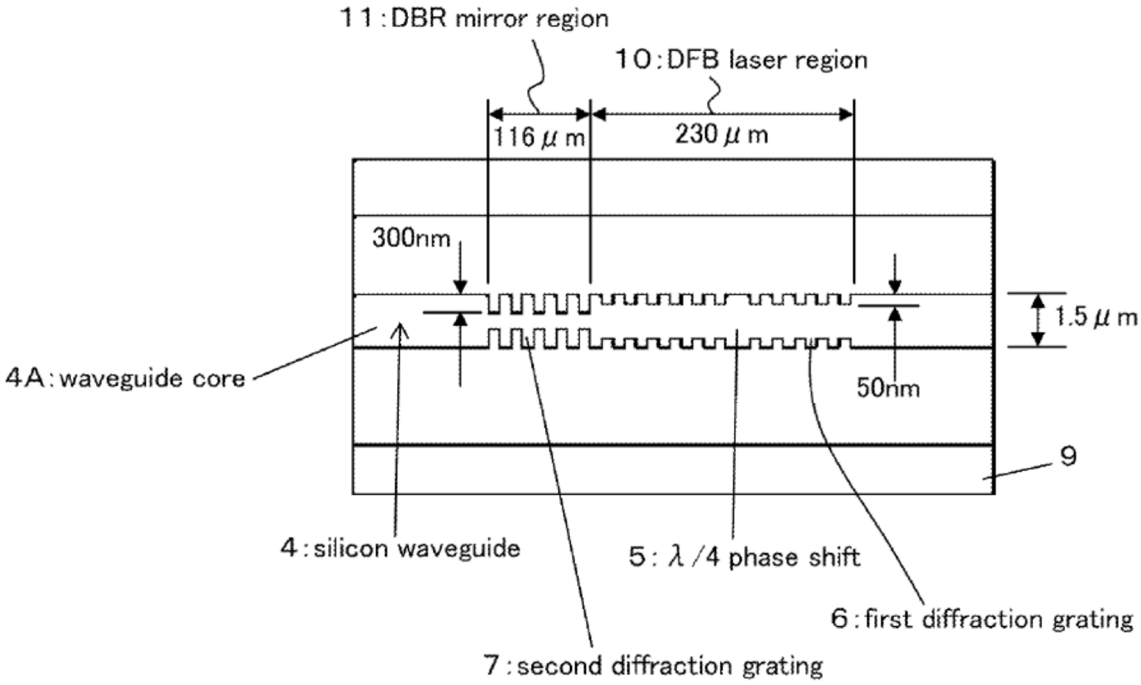

Figure 3 illustrates Akiyama's silicon waveguide substrate Akiyama discloses that first and second diffraction gratings 6 and 7 are formed by periodically varying the width of waveguide core 4A of silicon waveguide 4, so that first diffraction grating 6 has a coupling coefficient and second diffraction grating 7 has another coupling coefficient (i.e., by forming periodic grooves with different depths in waveguide core 4A). *Id.* ¶¶ 37, 43, 45. As a result, second diffraction grating 7 has a deeper diffraction grating groove in comparison to first diffraction grating 6. *Id.* ¶ 38. Akiyama also teaches that "the equivalent refractive index varies along the waveguide." *Id.* ¶ 20.

In the process of making Akiyama's laser, light-emitting layer 12 covers first and second diffraction gratings 6 and 7. Akiyama ¶ 105. It is

unclear from Akiyama's disclosure whether light-emitting layer 12 covers first and second diffraction gratings 6 and 7 so the grooves of the gratings remain as unfilled openings, or whether the material of light-emitting layer 12 fills those grooves. Nonetheless, either structure corresponds to the patterning structure of one of Appellant's embodiments. Specifically, Appellant discloses its "patterns are chosen from the group consisting of openings formed in the second waveguide and blades." Spec. 4:11–12. When the patterns are blades, the blades are formed by making holes in the second waveguide and filling the holes with a material. Spec. 20:28–21:1.

Thus, although Akiyama describes elements 6 and 7 as diffraction gratings and Appellant's Specification states its patterning "is not a diffraction grating," the record supports the Examiner's finding that Akiyama's diffraction gratings 6 and 7 correspond to the recited patterning, because diffraction gratings 6 and 7 have substantially the same structure as Appellant's patterning (i.e., either openings in a waveguide or openings filled with another material) and perform the same function as Appellant's patterning (i.e., evanescently coupling waveguides).

When arguing that Akiyama's diffraction gratings 6 and 7 cannot be the recited patterning, Appellant asserts "[b]y contrast, it is to be noted that Akiyama uses the diffraction gratings 6 and 7 to make a laser, the diffraction gratings notably serving as mirrors." Appeal Br. 10 (citing Akiyama ¶¶ 26, 28). These arguments are unpersuasive in view of the above analysis and the teachings by Akiyama and Faccio that a grating optically couples waveguides.

Appellant argues "Akiyama does not disclose or suggest any structure of the type of Applicant's claimed invention, namely one that relies on

interferential effects which is contrary to the system in Akiyama." Appeal Br. 9. Appellant further argues that the recited patterning extracts light by modifying the effective index, whereas Akiyama's gratings only amplify the field in the gain medium. Reply Br. 2–3. According to Appellant, "the Akiyama reference relates to a fundamentally different device than the present claims, and Examiner appears to have overlooked these important distinctions." *Id.* at 3. Appellant continues that "modifying the effective index as is done in Applicant's claims is substantially different compared to amplifying the field in the gain medium which is done by Akiyama." *Id.* at 4. These arguments are not persuasive because claims 1 and 15 do not require that the patterning modifies an effective index. Moreover, Appellant does not explain why Akiyama's device amplifies the field in a gain medium. Appellant only presents attorney argument that is lacking evidentiary support. *See In re Pearson*, 494 F.2d 1399, 1405 (CCPA 1974) ("Attorney's argument in a brief cannot take the place of evidence.").

Appellant further contends that "the patterning of the claimed invention relies on the coupling of evanescent waves" and "the coupling of evanescent waves as in the present claims is not described by the same equations as the equation of an interferential diffraction grating as in Akiyama." Appeal Br. 10. As noted above, Akiyama describes evanescent coupling of optical waveguides and describes substantially the same basic structure (i.e., openings or blades) as Appellant's patterning. In addition, claims 1 and 15 do not recite evanescent coupling via a particular equation (other than the period of the patterning). And Appellant does not identify any particular equations Akiyama discloses or explain how its argument

otherwise demonstrates a patentable distinction between claims 1 and 15 and the combination of Akiyama and Faccio.

Appellant argues that "Akiyama does not disclose or suggest that the proposed parameters of the grating ensure obtaining a coupling efficiency superior to 15%" and "it is impossible to obtain the efficiency of the present claims through the use of the device disclosed in Akiyama." Appeal Br. 11. These arguments are unpersuasive because they do not address the Examiner's rejection. The Examiner determines that the combination of Akiyama and Faccio would have provided coupling that is greater than 15%, as claims 1 and 15 recite, because Faccio describes a tunable grating assisted optical coupler that provides "complete power exchange," which suggests coupling greater than 15%. Final Act. 7, 10. In other words, Faccio suggests coupling as great as 100% due to its disclosure of "complete power exchange" when coupling waveguides. Faccio ¶¶ 1, 50.[4]

In addition, Appellant asserts that Faccio teaches away from the invention of claims 1 and 15 because Faccio relates to a counter-propagating embodiment, not a co-propagating configuration. Appeal Br. 11–12. Appellant also argues Faccio's equation II applies to a co-propagating configuration, whereas Faccio's equation I applies to a counter-propagating configuration, but that the Examiner either attempts to combine Akiyama's co-propagating configuration with Faccio's counter-propagating configuration or relies upon Faccio's co-propagating configuration and

[4] Appellant also asserts that Faccio also does not disclose or suggest coupling equal to or greater than 15%. *Id.* at 13. This argument is unpersuasive in view Faccio's disclosure of "complete power exchange." Faccio ¶ 50.

equation I, which does not satisfy the claimed patterning period. Reply Br. 4–5.

"The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference." *In re Keller*, 642 F.2d 413, 425 (CCPA 1981). "Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art." *Id.* Appellant's arguments are not persuasive because they fail to consider what Akiyama's and Faccio's combined teachings would have taught or suggested to one of ordinary skill in the art. The Examiner mentions Faccio's equations when explaining the rejection because the equations describe a relationship between certain parameters. Specifically, the Examiner concludes it would have been obvious to optimize the patterning period in view of Faccio's teachings of a relationship between grating period, two times the refractive index of the second waveguide, and the wavelength of light. Final Act. 6, 8; Ans. 7. Faccio's disclosure supports the Examiner's finding as to this relationship. Faccio ¶ 7.

"[D]iscovery 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 (CCPA 1980). Because Faccio recognizes patterning period as a result effective variable, we find that it would have been a matter of routine experimentation and design within the level of the ordinary skill to modify the period of Akiyama's diffraction gratings in view of Faccio's teachings to arrive at a patterning period within the scope of claims 1 and 15.

In view of the foregoing, Appellant does not identify a reversible error in the Examiner's rejection of claims 1 and 15. Accordingly, we affirm the

Examiner's rejection of claims 1, 2, 4, 5, 7, 9, 11, and 14–16 under 35 U.S.C. § 103.

Claims 3 and 6

Claim 3 depends from claim 1 and recites "wherein the patterns have a dimension along the transverse direction larger than the dimension of the core of the second waveguide along the transverse direction." Appeal Br. 21 (Claims App'x). Claim 6 depends from claim 1 and recites "wherein each pattern is arranged both in the core and the cladding of the second waveguide." *Id.* Although Appellant argues claims 3 and 6 separately, we address both claims here for the sake of efficiency.

The Examiner treats claims 3 and 6 together and determines that those claims would have been obvious over the combination of Akiyama and Faccio, finding "[i]n this case, each pattern is arranged both in the core and the cladding of the second waveguide." Final Act. 12. The Examiner does not elaborate or cite to any disclosure in Akiyama or Faccio to support the obviousness determination. *See id.*

Appellant argues that neither Akiyama nor Faccio suggests claim 3's or claim 6's pattern but, instead, disclose patterns inside a core that do not have the recited dimension. Appeal Br. 14.

The Examiner provides a section in the Answer that begins "[w]ith regard to claims 3, 6, and 12," but this section only responds to Appellant's arguments for claim 12. Ans. 8–10. In other words, the Examiner provides no further explanation supporting the rejection of claim 3 or claim 6. As a result, the Examiner does not set forth a prima facie case of obviousness for claims 3 and 6. Accordingly, we reverse the Examiner's rejection of claims 3 and 6 under 35 U.S.C. § 103.

Claim 12

Claim 12 recites:

> The optical coupler according to claim 1, wherein the optical coupler includes a third waveguide distinct from the first and second waveguides and extending parallel to the first and second waveguides, the third waveguide being arranged between the first waveguide and the second waveguide and being capable of propagating a third light propagation mode having a third effective index.

Appeal Br. 22 (Claims App'x).

The Examiner rejects claim 12 over the combination of Akiyama and Faccio, concluding that "[t]he use/implementation of an additional layer(s) and waveguide(s) would be well within the ordinary skill in the art and does not rise above the threshold of novelty." Ans. 13–14. In other words, the Examiner appears to conclude that claim 12 encompasses the mere duplication of a waveguide of the Akiyama and Faccio combination.[5]

Appellant asserts that "[n]either Akiyama or Faccio discloses or suggests such a third waveguide, much less any disclosure or suggestion as to why a third waveguide would be used when arranged between the first and the second waveguide" and "[n]othing suggests to one skilled in the art that using such a third waveguide results in a better behavior for the coupler." Appeal Br. 14–15. These arguments, however, do not address the Examiner's rationale, which relies on duplicating known elements with predictable results.

[5] Merely duplicating known elements is likely to be obvious when the results are predictable. *See In re Harza*, 274 F.2d 669, 671 (CCPA 1960) ("It is well settled that the mere duplication of parts has no patentable significance unless a new and unexpected result is produced.").

Moreover, as noted above, claim 12 recites a third waveguide "distinct form the first and second waveguides." Although this limitation encompasses a third waveguide that is physically separate or distinct in location from the first and second waveguide (e.g., arranged between the first and second waveguides, as claim 12 recites), the third waveguide need not be distinct in its properties. Claim 12 further recites that the third waveguide has "a third effective index," but does not require that the third effective index be different from the first and/or second index of the first or second waveguide. Claim 12 also recites that the third waveguide is capable of propagating a third light propagation mode, but this does not require that the third mode differ from the modes of the first or second waveguide. Therefore, the Examiner sets forth a prima facie case obviousness for claim 12 based on duplication of parts. As such, we affirm the Examiner's rejection of claim 12 under 35 U.S.C. § 103.

Rejection over Akiyama, Faccio, and Madsen

The Examiner rejects claims 8 and 10 under 35 U.S.C. § 103 as unpatentable over Akiyama in view of Faccio and further in view of Madsen. Claims 8 and 10 depend from claim 1 and add further limitations to the optical coupler. Claim 8 recites "wherein the spacing along the longitudinal direction between the patterns is variable in the longitudinal direction." Appeal Br. 21 (Claims App'x). Claim 10 recites "wherein the core of the second waveguide has a variable dimension in the transverse direction." *Id.* at 22.

The Examiner finds Akiyama and Faccio do not expressly teach the limitations of claims 8 and 10, but "Madsen discloses a *vertically-stacked grating-assisted coupler* (the same type of that of Akiyama and Faccio)" and

discloses an embodiment in which spacing of a pattern and core cross-section are varied along a longitudinal direction, citing Madsen's Figures 1 and 6. Final Act. 14. The Examiner concludes it would have been obvious to vary the pattern spacing and cross-section of Akiyama and Faccio along the longitudinal direction in view of Madsen's teachings in order to improve coupling efficiency between an input element and an output element with dissimilar transverse optical sizes. *Id.* at 14–15.

Appellant argues that Madsen discloses a horizontal coupler, not a vertically-stacked coupler. Appeal Br. 15. Appellant's arguments are persuasive. Madsen's Figure 1 depicts a horizontal arrangement in which a segmented waveguide section 14 couples a fiber core 12 with a smaller waveguide core 13. Madsen 3:3–5. As noted at page 6 of the Reply Brief, the Examiner does not respond to Appellant's arguments in the Answer to explain why it would have been obvious to modify the combination of Akiyama and Faccio in view of Madsen, which discloses a different type of arrangement than Akiyama and Faccio.

Accordingly, we reverse the Examiner's rejection of claims 8 and 10 under 35 U.S.C. § 103.

Rejection over Akiyama, Faccio, and Chen

The Examiner rejects claims 13 and 17–20 under 35 U.S.C. § 103 as unpatentable over Akiyama in view of Faccio and further in view of Chen. Claims 13 and 17–20 require a "thermal insulation zone" (claim 13) or a "thermal insulation element" (claims 17–20). Appeal Br. 22–25 (Claims App'x).

The Examiner finds that Akiyama and Faccio do not disclose or suggest the use of a thermal insulation element. Final Act. 15. The

Examiner finds Chen discloses a laser that generates heat and is embedded in an optoelectronic board, and discloses a heat sink that functions as a thermal insulation element and is incorporated in the optoelectronics board. *Id.* The Examiner concludes it would have been obvious to add a thermal insulation element to the laser waveguide of Akiyama and Faccio, which would also generate heat, so the heat is directed away from the coupler and does not adversely affect the performance of the laser. *Id.* For claim 20, the Examiner further cites to Akiyama's substrate and waveguides and to Chen's heat sink. *Id.* at 16.

Appellant contends Chen does not disclose or suggest a thermal insulation zone, as claim 13 recites, because "Chen discloses a heat sink 100 or 200 connected to the substrate . . . and not to the waveguides 106 or 108." Appeal Br. 16. With regard to claims 17 and 19, Appellant similarly asserts that Chen's heat sink is not connected to Chen's waveguides because the heat sink is instead connected to the substrate. *Id.* at 17–18.

Appellant's arguments regarding the thermal insulation arrangement do not identify a reversible error in the Examiner's rejection over Akiyama, Faccio, and Chen. Claim 13 recites "a thermal insulation zone of the first waveguide in which the patterning is arranged." Appeal Br. 22 (Claims App'x). Therefore, claim 13 requires that the thermal insulation provides a zone for the first waveguide in which the patterning is arranged, not that the thermal insulation is directly connected to the first waveguide, as Appellant appears to argue. Claims 17 and 19 recite "a thermal insulation element connected to the first or second waveguide." *Id.* at 24–25. Thus, claims 17 and 19 also do not require a direct connection between thermal insulation and a first or second waveguide, but merely require a connection between

the thermal insulation and a waveguide, whether it is indirect (e.g., via other structures) or direct. As a result, Appellant's arguments do not reflect the limitations of claims 13, 17, and 19 or their scope.

Appellant argues "[s]ince Claim 20 includes all of the elements of Claim 19, it is patentable over the cited references for at least the same reasons as stated above with regard to Claim 19" but "Chen clearly does not have the substrate/waveguide pattern nor the thermal insulated element as set forth in Claim 20." *Id.* at 18. As explained above, Appellant's arguments do not identify a reversible error in the Examiner's rejection of claim 19. Appellant's further argument that Chen does not disclose or suggest the thermal insulated element of claim 20 amounts to a general denial that merely references the limitations of claim 20 without identifying a reversible error in the Examiner's rejection.

With regard to claim 18, Appellant contends that the Examiner's position "is incorrect because the U-shaped heat sink in Chen [is] clearly different and is not an opening or a blade as claimed by Applicant." *Id.* at 17. This argument is not persuasive. The Examiner rejects claim 18 by finding that "Fig. 2 of Chen shows that the thermal insulation element 200 is patterned to have an opening between at least two vertical blades." Final Act. 15–16. An annotated copy of Chen's Figure 2 is reproduced below.

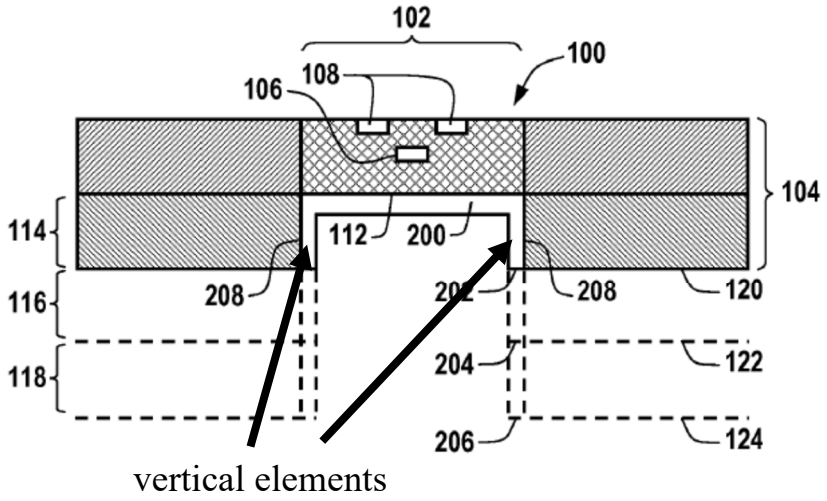

Fig. 2

Figure 2 is a cross-sectional view of an electrical-to-optical transmitter

The Examiner appears to reference the vertical elements of Chen's heat sink 200 shown above in the annotated copy of Figure 2 when finding the thermal insulation element 200 has an opening between two vertical blades. Appellant's arguments do not identify a reversible error in this finding or otherwise explain why these vertical elements, as annotate above, do not function as blades of a thermal insulation element.

Accordingly, we affirm the Examiner's rejection of claims 13 and 17–20 under 35 U.S.C. § 103.

CONCLUSION

We affirm the Examiner's rejections of claims 1, 2, 4, 5, 7, 9, 11, 12, and 14–16 under 35 U.S.C. § 103 over Akiyama and Faccio, and claims 13 and 17–20 under 35 U.S.C. § 103 over Akiyama, Faccio, and Chen. We reverse the Examiner's rejections of claims 3 and 6 under 35 U.S.C. § 103

over Akiyama and Faccio, and claims 8 and 10 under 35 U.S.C. § 103 over Akiyama, Faccio, and Chen.

In summary:

Claims Rejected	35 U.S.C. §	References/Basis	Affirmed	Reversed
1–7, 9, 11, 12, 14–16	103	Akiyama, Faccio	1, 2, 4, 5, 7, 9, 11, 12, 14–16	3, 6,
8, 10	103	Akiyama, Faccio, Madsen		8, 10
13, 17–20	103	Akiyama, Faccio, Chen	13, 17–20	
Overall Outcome			1, 2, 4, 5, 7, 9, 11, 12–20	3, 6, 8, 10

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED IN PART