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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* JOE DENTON BROWN

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Appeal 2019-004795  
Application 14/811,127  
Technology Center 2800

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Before LINDA M. GAUDETTE, MONTÉ T. SQUIRE, and  
JANE E. INGLESE, *Administrative Patent Judges*.

GAUDETTE, *Administrative Patent Judge*.

DECISION ON APPEAL<sup>1</sup>

The Appellant<sup>2</sup> appeals under 35 U.S.C. § 134(a) from the Examiner’s decision twice rejecting claims 1–9 under 35 U.S.C. § 102(a)(1) as

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<sup>1</sup> This Decision includes citations to the following documents: Specification filed July 28, 2015 (“Spec.”); Non-Final Office Action dated September 21, 2017 (“Non-Final”); Appeal Brief filed April 2, 2018 (“Appeal Br.”); Examiner’s Answer dated April 2, 2019 (“Ans.”); and Reply Brief filed June 3, 2019 (“Reply Br.”).

<sup>2</sup> We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. The Appellant identifies the real party in interest as the inventor, Joe Denton Brown. Appeal Br. 1.

anticipated by, and claim 10 under 35 U.S.C. § 103 as unpatentable over, Berens (US 2008/0170221 A1, published July 17, 2008).<sup>3</sup>

We AFFIRM IN PART.

### CLAIMED SUBJECT MATTER

The claims are directed to an optical fiber that provides an indication that breakage is imminent, and a method of manufacturing such a fiber. Independent claims 1, 7, and 8, reproduced below, are illustrative of the claimed subject matter:

1. An optical fiber having a core, at least one cladding layer, and at least one buffer layer, comprising:
  - a built-in damage or wear detector in the form of phosphors that emit light of a characteristic emission wavelength  $\lambda_2$  in response to leakage of light from the core through the at least one cladding layer, said light leaking from the core having an interrogation wavelength  $\lambda_1$  and/or a characteristic pattern or signature, wherein stimulation of phosphor emission by the light of interrogation wavelength  $\lambda_1$  and/or a characteristic pattern or signature is indicative of aging or wear on layers surrounding the at least one cladding layer, and therefore of the risk of imminent breakage of the fiber,
  - wherein the phosphors are applied as a coating on or incorporated into at least one of the cladding layer and the buffer layer.

7. A method of making an optical fiber having an integrated wear or damage detector, comprising the steps of (a) applying a phosphor coating to a cladding or buffer layer of the optical fiber, and/or (b) incorporating phosphors into the buffer layer or layers surrounding the cladding layer, the applied or incorporated phosphors emitting light of a characteristic wavelength  $\lambda_2$  in response to leakage, from the core of the optical fiber through the fiber cladding, of light having an

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<sup>3</sup> We have jurisdiction under 35 U.S.C. § 6(b).

interrogation wavelength  $\lambda_1$  and/or a characteristic pattern or signature.

8. A method of assessing or detecting damage to layers or coatings of an optical fiber, and therefore of predicting a risk of imminent breakage, comprising the steps of:

introducing into the optical fiber light having an interrogation wavelength  $\lambda_1$ ; and

detecting damage to the fiber by detecting emissions of wavelength  $\lambda_2$  that result from stimulation of phosphors applied to or incorporated into a cladding and/or buffer layer of the optical fiber when excess leakage of the interrogation beam from a core of the optical fiber occurs.

Appeal Br. 14–15 (Claims Appendix).

#### OPINION

The Examiner rejected independent claims 1, 7, and 8, and dependent claims 2–6 and 9, as anticipated by Berens, and rejected dependent claim 10 as unpatentable over Berens. *See* Non-Final 4–11. As to the anticipation rejection, the Appellant argues in support of patentability of independent claims 1, 7, and 8. *See* Appeal Br. 6–12. The Appellant’s arguments in support of patentability of claim 10 are substantively the same as those made in support of patentability of claim 8, from which claim 10 depends. *See id.* at 12–13.

Berens describes fiber optic cable 100 as comprising the following arrangement of parts beginning with the cable’s interior: core 160, cladding 150, buffer 140, braided layer 130, and jacket 110. Berens ¶ 20. Berens discloses that buffer 140 surrounds and protects cladding 150. *Id.* Berens describes braided layer 130 as providing conduit pull strength and jacket 110 as a plastic coating. *Id.* Berens discloses that “jacket 110 can be further embedded with luminescent compound 120 distributed throughout jacket

110 . . . [that] can be excited by an LED output to generate a fluorescence or phosphorescence.” *Id.* ¶ 21.

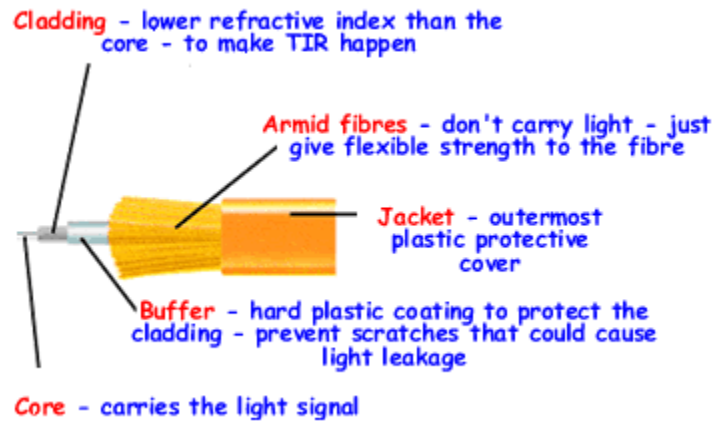
The Examiner determined that the claim term “buffer layer,” recited in each of independent claims 1, 7, and 8, encompasses Berens’s jacket 110 because “[t]he jacket of Berens buffers the cable from the environment.” Non-Final 11. The Examiner explains that “[t]he term ‘buffer layer’ is seen as a generic term in the art for one or more of [the many] coating and protecting layers” in fiber optic cables and “does not imply any specific materials or functions.” Ans. 4; *see also id.* at 10 (“[I]f it operates as a buffer, the structure is a buffer.”).

The Appellant contends that the Examiner failed to apply the proper claim interpretation standard, referencing the Examiner’s statement that interpreting the claimed “buffer layer” as encompassing Berens’s jacket “does no violence to the [claim] language *despite the fact that it may be inconsistent with common use*” (Non-Final 11, 13). *See* Appeal Br. 9–12. The Appellant argues that the Examiner’s interpretation of “buffer layer” is unreasonable because “it is contrary to the ordinary meaning of the word ‘buffer’ in the optical fiber art,” and “contrary to [Berens’s] usage of ‘buffer.’” *Id.* at 7. We agree.

During examination, claim terms are given their broadest reasonable construction consistent with the Specification, *In re ICON Health & Fitness, Inc.*, 496 F.3d 1374, 1379 (Fed. Cir. 2007), “as [they] would be interpreted by one of ordinary skill in the art,” *In re Suitco Surface, Inc.*, 603 F.3d 1255, 1260 (Fed. Cir. 2010) (citation omitted).

The Specification discloses that “an optical fiber includes a core, a cladding, and a buffer layer,” each of which is “conventional” and “well

known to those skilled in the art.” Spec. 6:16–19. The Appellant cites <http://www.cyberphysics.co.uk/topics/light/FiberOptics/FibreOptics.htm> (“the Cyberphysics website”)<sup>4</sup> for a description of a conventional optical fiber’s structure. Appeal Br. 2. The Cyberphysics website’s illustration of an optical fiber is reproduced below.



The Cyberphysics website Figure, above, depicts an optical fiber having the following arrangement of parts beginning with the cable’s interior: a core, a cladding, a buffer, aramid fibers, and a jacket. The Figure includes a description of the “buffer” as a “hard plastic coating to protect the cladding – prevent scratches that could cause light leakage.” The Figure describes the “aramid fib[er]s” as “giv[ing] flexible strength to the [optic fiber],” and describes the “jacket” as an “outermost plastic protective cover.”

Comparing the above Cyberphysics website’s description with Berens’s description of fiber optic cable 100 (*supra* pp. 3–4), we are persuaded that the ordinary artisan would have understood the terms “buffer layer” and “jacket” as referring to specific, individual parts of an optical

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<sup>4</sup> The website describes itself as “a web-based teaching aid - for students of physics, their teachers and parents.”

fiber cable. In particular, the ordinary artisan would have understood that the buffer layer surrounds and protects the cladding, and differs from the jacket, which is a typical optical fiber cable's outermost layer or coating. *Compare* the Cyberphysics website Figure, *with* Berens ¶ 20, Fig. 1. Accordingly, we agree with the Appellant that the Examiner reversibly erred in determining that the claim term "buffer layer" (claims 1, 7, 8) reads on Berens's jacket 110.

The Examiner argues that even if the term "buffer layer" does not encompass Berens's jacket 110, independent claims 1, 7, and 8 still read on Berens's fiber optic cable 100, method of making the cable, and method of detecting damage to cable layers, because "claim 1 (as well as independent claims 7 and 8) recite that 'the phosphors are applied as a coating on or incorporated into at least one of the cladding layer and the buffer layer.'" Ans. 3. The Appellant responds that "the inclusion of phosphors in a jacket that surrounds a metal braid that surrounds a buffer can[not] be construed as the phosphors being 'coated on' the buffer" as recited in the independent claims, and asserts that "[m]erely 'surrounding' is not a synonym for coating." Reply Br. 2.

"[T]he [USPTO] must give claims their broadest reasonable construction consistent with the specification. . . . Therefore, we look to the specification to see if it provides a definition for claim terms but otherwise apply a broad interpretation." *ICON Health*, 496 F.3d at 1379; *see* 35 U.S.C. § 112 (a)–(b) ("The specification shall contain a written description of the invention . . . . The specification shall conclude with one or more claims . . . ."). The disputed claim language is not identical in claims 1, 7, and 8.

Therefore we consider the broadest reasonable interpretation of the disputed language for each of these claims.

*Claim 1*

Claim 5 depends from independent claim 1. 35 U.S.C. § 112(d) provides that “a claim in dependent form shall contain a reference to a claim previously set forth and then specify a further limitation of the subject matter claimed.” Thus, to satisfy the requirements of 35 U.S.C. § 112(d), the claim 1 limitation “wherein the phosphors are applied as a coating on or incorporated into at least one of the cladding layer and the buffer layer” must be broader than (encompass) the claim 5 limitation “the phosphors are provided as part of a *separate coating surrounding* the at least one cladding layer” (emphasis added).

We turn next to the written description to see if it provides definitions for any claim terms—for example, a definition of “separate coating surrounding” (claim 5)—that indicates the scope of the invention is limited to a phosphor coating directly adjacent the cladding layer, i.e., without any intervening layers or coatings between the two. *See In re Tanaka*, 640 F.3d 1246, 1250 (Fed. Cir. 2011) (“[E]ach claim of a patent has a purpose that is separate and distinct from the remaining claims. Claims of narrower scope can be useful to clarify the meaning of broader, independent claims under the doctrine of claim differentiation.” (citations omitted)). The Specification explains that predicting when a fiber will break from damage to *layers* surrounding the core or cladding is currently impractical or impossible. Spec. 2:4–8, 20–24. Thus, “an objective of the invention [is] to provide a way to assess damage [to] the *coatings* of an optical fiber and thereby predict breakage of the optical fiber before it occurs.” *Id.* at 3:9–12



(emphasis added); *see also id.* at 1:12–17 (“[The] invention relates to optical fibers, and in particular to detection of *coating* degradation that presents a risk of imminent breakage[, and] . . . to a method of manufacturing optical fibers to enable detection of coating degradation.” (emphasis added)). The Specification discloses that this objective is achieved by “a damage-detecting, breakage-predicting phosphor *layer*.” *See id.* at 6:10–11 (emphasis added). “[P]hosphors may be provided as part of a *separate coating surrounding* the cladding or layers of the buffer, or may be incorporated into the material of the buffer.” *Id.* at 4:7–10. “When light of wavelength  $\lambda_1$  is present in the leakage, the phosphors in the phosphor *coating* are stimulated and emit light of wavelength  $\lambda_2$ . The resulting light emission from the phosphor *coating* is visible or detectable to provide a warning that breakage is imminent . . . .” *Id.* at 8:2–7 (emphasis added); *see also id.* at 7:25–26 (“As the *coatings or layers* surrounding the fiber deteriorate, leakage of light increases . . . .” (emphasis added)); *id.* at 15 (claim 8) (reciting “[a] method of assessing or detecting damage to *layers or coatings* of an optical fiber”).

The Specification discloses that “[i]n the preferred embodiment illustrated in Fig. 1 . . . a phosphor *coating* is added *between* the cladding and buffer layer.” *Id.* at 7:10–12 (emphasis added). The Specification states that “[a]lthough depicted as a single *coating layer between* the cladding and a buffer layer, it will be appreciated that the wear or damage detector in the form of the phosphor coating [may] alternatively take the form of *multiple coatings*, of one or more coatings *between* multiple cladding and/or buffer *layers*, or of phosphors incorporated directly into the cladding and/or buffer layers of the optical fiber.” Spec. 9:16–22 (emphasis added).

The above citations and quotations evidence the inventor's use of both "coating" and "layer" to describe the cladding, buffer, and phosphors, and, therefore, that these terms are synonymous as used in the Specification.

We did not find an occurrence of the claim 1 term "coating on" in the original Specification. Nor did we find any indication that the scope of "applied as a *coating on*" (claim 1) a layer differs from the scope of a separate coating or layer *between* other layers as described in the Specification. For example, we found no indication that "applied as a *coating on*" requires affixing the phosphors to the cladding layer or buffer layer, or positioning a phosphor-containing coating directly adjacent to one of these layers (i.e., without any intervening layers or coatings between the two). Accordingly, we determine that the broadest reasonable interpretation of the claim 1 "wherein" clause encompasses Berens's cladding 150 which is surrounded by Berens's luminescent compound 120-containing jacket 110. We note that Berens similarly uses both "coating" and "layer" in describing jacket 110 and, as acknowledged by the Appellant (*see* Reply Br. 2), luminescent compound 120-containing jacket 110 is a separate structure that surrounds the other optical fiber layers. *Compare* Berens Title, Abstract ("Fiber optic cable systems and methods incorporating a luminescent compound-containing *layer* to identify cracks." (emphasis added)), *with* Berens ¶¶ 20–21 ("FIG. 1 illustrates an exemplary embodiment of a fiber optic cable 100 incorporating a luminescent polymer *layer* to identify cracks. . . . Braided layer 130 is surrounded by jacket (plastic *coating*) 110. . . . [J]acket 110 can be further embedded with

luminescent compound 120 distributed throughout jacket 110.” (emphasis added)).<sup>5</sup>

*Claim 7*

Independent claim 7 recites “*incorporating phosphors into the buffer layer or layers surrounding the cladding layer.*” Appeal Br. 15 (Claims Appendix) (emphasis added). As with claim 1, we review the written description to determine whether the broadest reasonable interpretation of this claim 7 phrase encompasses Berens’s step of embedding luminescent compound 120 into jacket 110 which surrounds cladding 150. *See Berens* ¶¶ 20–21.

The Specification discloses that the inventive “method modifies conventional fiber manufacturing methods by *adding* the step of applying a phosphor coating to the cladding or to a buffer layer of the optical fiber, and/or the *steps of incorporating phosphors into a* [sic] buffer layers or *layers surrounding the fiber cladding.*” Spec. 10:1–6 (emphasis added). As evidenced by the Cyberphysics website Figure, as well as Berens, the layers surrounding an optical fiber’s cladding are not limited to the buffer layer, but include a jacket. Accordingly, we determine that the broadest reasonable interpretation of the claim 7 “incorporating” step encompasses Berens’s step

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<sup>5</sup>*Cf.* The American Heritage Dictionary (accessed June 24, 2020), <https://www.ahdictionary.com/word/search.html?q=layer> (Layer: “2a. A single thickness of a *material covering a surface* or forming an overlying part or segment . . .” (emphasis added)), <https://www.ahdictionary.com/word/search.html?q=coating> (Coating: “1. A layer of a substance spread over a surface as for protection or decoration; *a covering layer.*” (emphasis added))).

of embedding luminescent compound 120 into jacket 110 which surrounds cladding 150.

*Claim 8*

Independent claim 8 recites “phosphors applied to or incorporated into a cladding and/or buffer layer.” Spec. 15 (Claims Appendix). Having considered this language in light of the Specification, we find no basis for interpreting this language to exclude Berens’s jacket 110 with incorporated phosphors 120 that surrounds cladding 150 and buffer 140. *See In re Baker Hughes, Inc.*, 215 F.3d 1297, 1303 (Fed. Cir. 2000) (explaining that the USPTO cannot adopt a construction that is “beyond that which was reasonable in light of the totality of the written description” in the Specification). Berens evidences that the ordinary artisan would have understood that the term “applied,” as used in describing the components of an optical fiber, encompasses surrounding a layer or layers with another layer or coating. *See* Berens ¶¶ 20–21 (describing “optic cable fabrication processes” as follows: “Braided layer 130 is surrounded by jacket (plastic coating) 110. . . . Prior art jackets are typically orange for MMF and yellow for SMF. . . . In one exemplary embodiment . . . the [prior art] yellow or orange jacket (PVC material) is merely replaced with transparent PVC and *applied* in an identical fashion.” (emphasis added)).

In sum, for the reasons discussed above, we are not persuaded that the Examiner’s rejections are based on unreasonably broad interpretations of “a coating on” (claim 1), “applying a . . . coating to” (claim 7) and “phosphors applied to” (claim 8) a cladding or buffer layer as encompassing Berens’s jacket 110 embedded with luminescent compound 120.

The Appellant also argues that “phosphors 120 of Berens are not used to detect light leaking from the core.” Appeal Br. 7. The Appellant explains that

when detecting light launched into the buffer and cladding as well as the core, as Berens does, it is not possible to determine which of the detected light is the result of core leakage and which is the result of leakage from the cladding and the buffer. The present invention seeks to detect light leaking from the core (due to degradation of the cladding), and therefore places the phosphors in the layer next to the cladding, *i. e.*, the buffer layer.

Reply Br. 4.

The Appellant’s arguments are not persuasive of error in the Examiner’s rejections because they are not directed to limitations recited in claims 1, 7, or 8. Claims 1 and 7 require that the phosphors are only *capable of* responding to light leakage from the optical fiber core through the fiber cladding. *See* Appeal Br. 14–15 (Claims Appendix). The Appellant has not explained why Berens’s luminescent compound 120 fails to meet this requirement. Claim 8 recites “detecting damage to the fiber by detecting emissions of wavelength  $\lambda_2$  that result from stimulation of phosphors applied to or incorporated into a cladding and/or buffer layer of the optical fiber *when* excess leakage of the interrogation beam from a core of the optical fiber occurs.” Appeal Br. 15 (Claims Appendix) (emphasis added). When a claim recites a method step that is conditioned on the occurrence of some event, the broadest reasonable interpretation of the scope of that claim may encompass two separate methods: one in which the conditional step occurs and one in which the conditional step does not occur. *Ex parte Schulhauser*, No. 2013-007847, 2016 WL 6277792, at \*4–5 (PTAB Apr. 28, 2016) (precedential); *see also Cybersettle, Inc. v. Nat’l Arbitration Forum*,

*Inc.*, 243 Fed. Appx. 603, 607 (Fed. Cir. 2007) (unpublished) (“It is of course true that method steps may be contingent. If the condition for performing a contingent step is not satisfied, the performance recited by the step need not be carried out in order for the claimed method to be performed.”). Because the claim 8 “detecting” step is contingent on the occurrence of excess leakage of the interrogation beam from the core, claim 8 reads on a method that includes only the first claim 8 step. The Appellant has not explained persuasively why Berens fails to disclose a method that includes the first claim 8 step. *See, e.g.*, Ans. 5–7. “Claims which are broad enough to read on obvious subject matter are unpatentable even though they also read on nonobvious subject matter.” *In re Lintner*, 458 F.2d 1013, 1007 (CCPA 1972) (citation omitted).

Any remaining arguments made by the Appellant regarding the Examiner’s rejections of claims 1–5 and 7–10, but not discussed in this Decision, are not persuasive for the reasons explained by the Examiner in the Answer. Accordingly, we sustain the rejections of claims 1–5 and 7–10.

#### *Claim 6*

The Examiner acknowledges that claim 6, dependent from claim 1, requires that the phosphors are incorporated into the buffer layer. Ans. 3–4; *see* Appeal Br. 15 (Claims Appendix). The Examiner’s finding that Berens teaches this limitation is based on an interpretation of the “buffer layer” as encompassing Berens’s jacket 110. Above, we determined that this interpretation is overly broad. Although the Appellant does not argue separately in support of patentability of dependent claim 6, we nonetheless reverse the rejection of this claim as anticipated by Berens. *See* 37 C.F.R. § 41.37(c)(iv) (“Notwithstanding any other provision of this paragraph, the

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failure of the appellant to separately argue claims which appellant has grouped together shall constitute a waiver of any argument that the Board must consider the patentability of any grouped claim separately.”).

#### DECISION SUMMARY

<b>Claims Rejected</b>	<b>35 U.S.C. §</b>	<b>Reference(s)/Basis</b>	<b>Affirmed</b>	<b>Reversed</b>
1-9	102	Berens	1-5, 7-9	6
10	103	Berens	10	
<b>Overall Outcome:</b>			1-5, 7-10	6

#### 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).

**AFFIRMED IN PART**