

United States Court of Appeals for the Federal Circuit

2009-1364,-1365

HEARING COMPONENTS, INC.,

Plaintiff-Appellant,

v.

SHURE INC.,

Defendant-Cross Appellant.

Kevin M. Flannery, Dechert LLP, of Philadelphia, Pennsylvania, argued for plaintiff-appellant. With him on the brief were Joseph R. Heffern and Vincent A. Gallo.

Marc S. Cooperman, Banner & Witcoff, Ltd., of Chicago, Illinois, argued for defendant-cross appellant. With him on the brief were J. Peter van Es, Erik S. Maurer, Bradley J. Van Pelt and Katherine L. Fink.

Appealed from: United States District Court for the Eastern District of Texas

Judge Ron Clark

United States Court of Appeals for the Federal Circuit

2009-1364, -1365

HEARING COMPONENTS, INC.,

Plaintiff-Appellant,

v.

SHURE INC.,

Defendant-Cross Appellant.

Appeal from the United States District Court for the Eastern District of Texas in Case No. 9:07-CV-104, Judge Ron Clark.

DECIDED: April 1, 2010

Before LOURIE, RADER, and SCHALL, Circuit Judges.

LOURIE, Circuit Judge.

Hearing Components, Inc. (“Hearing Components”) appeals from the judgment of the United States District Court for the Eastern District of Texas determining that claims 1 and 2 of U.S. Patent 5,401,920 (the “920 patent”) are invalid as being indefinite. Hearing Components, Inc. v. Shure, Inc., No. 9:07-CV-104, slip op. at 11–13 (E.D. Tex. Dec. 1, 2008) (“Claim Construction Opinion”). Hearing Components also appeals from the court’s grant of judgment as a matter of law (“JMOL”) of noninfringement of claims 17 and 36 of U.S. Patent 4,880,076 (the “076 patent”) and claims 1 and 13 of U.S. Patent 5,002,151 (the “151 patent”) by Shure Inc.’s (“Shure’s”) earphones employing a straight nozzle. Hearing Components, Inc. v. Shure, Inc., No. 9:07-CV-104, 2009 U.S. Dist. Lexis 17163 (E.D. Tex. Mar. 6, 2009) (“Infringement Opinion”). Shure cross-

appeals from the court's denial of JMOL of noninfringement of the same claims of the '076 and '151 patents by Shure's earphones employing a barbed nozzle, *id.*, its denial of JMOL of invalidity, Hearing Components, Inc. v. Shure, Inc., No. 9:07-CV-104, 2009 U.S. Dist. Lexis 17168 (E.D. Tex. Mar. 6, 2009) ("Validity Opinion"), and its determination of no laches, J.A. 4940–49, for those patents. We affirm in part, reverse in part, and remand.

BACKGROUND

Hearing Components owns the three patents in suit. The '076 and '151 patents are related patents with similar specifications and are directed toward a hearing aid ear piece connected to a disposable, compressible foam sleeve by an attaching or fastening means, for inserting into the ear canal. The '920 patent describes and claims a fibrous guard that is sound-porous but blocks cerumen, or ear wax. Shure sells earphone products, including earphones with two different nozzle designs, straight and barbed.

In May 2007, Hearing Components sued Shure, accusing Shure of infringing the '076 and '151 patents with both the straight and barbed nozzle designs. All of the asserted claims of the '076 and '151 patents include an "attaching" or a "fastening" means. Claim 1 of the '151 patent reads as follows:

1. An ear piece component for use with a user-disposable sleeve, having a duct and soft polymeric foam firmly secured to the duct, to facilitate transmission of sound to an ear canal of a user, said ear piece component comprising:

a connecting portion having (i) distal and proximal ends and an exterior surface between said distal and proximal ends, (ii) a sound tube extending through said connecting portion between said distal and proximal ends, and (iii) means on said exterior surface for disposably attaching the duct of the sleeve to said connecting portion, and

a flange portion secured to said proximal end.

'151 patent col.14 ll.26–38 (emphasis added). Claims 13 of the '151 patent and 17 and 36 of the '076 patent further recite that the sleeve is “insertable into [the] ear canal of [a] user.” Although claim 1 of the '151 patent does not explicitly recite insertion into the ear canal, the court construed the recited “ear piece” component to mean “[a] constituent part of the portion that is inserted into the external ear canal, a part of which may extend outwardly into the bowl of the ear.” Claim Construction Opinion, slip op. at 5–6 (emphasis added); see Validity Opinion, 2009 U.S. Dist Lexis 17168 at *16 n.7.

Hearing Components also alleged that another Shure product infringed claims 1 and 2 of the '920 patent. Claim 1, which is representative of the asserted claims of the '920 patent and from which claim 2 depends, reads as follows:

1. For use in connection with a sound transmitting device of the type in which a housing contains a sound transmitting tube having a sound outlet port confronting the ear drum when said device is fitted within a user's ear canal,

a disposable wax guard for mounting over the sound outlet port to prevent cerumen from fouling said outlet port, said wax guard being readily installed and replaced by a user, comprising a thin, flexible membrane that permits a user to position said guard over said outlet port, one side of said membrane being provided with a normally tacky and pressure-sensitive adhesive layer except in that portion adapted to overlie said outlet port, the portion of said guard overlying said outlet port being porous to sound and capable of wax entrapment.

'920 patent col.6 ll.38–53 (emphasis added).

In December 2008, the district court construed certain claims of the patents in suit. Claim Construction Opinion, No. 9:07-CV-104. During claim construction, the court found the limitation in the '920 patent stating “said wax guard being readily installed and replaced by a user” indefinite. Id., slip op. at 11–13. The court reasoned that the word “readily” was not sufficiently explained in the specification. Id. at 12–13. According to the court, the specification first notes that some prior art products required

a tool or solvent to remove wax buildup, but it then disparages prior art products for having filters that were difficult to remove or replace by the elderly and those “unable to see clearly enough or to perform fine physical actions well enough.” Id. at 12. The court found that the specification’s standard for the word “readily” was so subjective that the court could not determine what the claim term meant in the context of the patent. Id. The court stated that “[i]t would be extremely difficult, if not impossible, for someone attempting to design around claim 1 to determine what test group of users would be used to measure ease of replacement and which degree of difficulty would be sufficient to avoid infringement. The court therefore finds this claim term indefinite.” Id. at 13.

The district court proceeded to trial on the ’076 and ’151 patents, and the jury found both patents not invalid and infringed by Shure’s products both with a barb and with a straight nozzle. The jury therefore awarded damages of \$4,622,999. Infringement Opinion, 2009 U.S. Dist. Lexis 17163 at *2. Shure moved for JMOL of invalidity of those patents and noninfringement by both its barbed- and straight-nozzled products. In March 2009, the court denied Shure’s motion for JMOL of invalidity and granted in part its motion for JMOL of noninfringement.

In addressing infringement on Shure’s motion for JMOL regarding the ’076 and ’151 patents, the district court focused on the “attaching” or “fastening” means. The court had previously determined that both “means” limitations were in means-plus-function format and therefore were governed by 35 U.S.C. § 112, paragraph 6. The court had further found that the corresponding structures for the limitations in all four claims were the same:

- (1) A duct to which a foam sleeve is firmly secured by (a) being molded onto the duct or (b) a layer of adhesive cement where: (i) The duct and ear

piece are connected using mating screw threads; (ii) The duct and ear piece are connected using a bayonet or ball-and-socket attachment; (iii) The duct and ear piece are connected using a layer of adhesive cement between the proximal end of the sleeve and the distal end of the ear piece; and

(2) Equivalents thereof.

Infringement Opinion, 2009 U.S. Dist. Lexis 17163 at *6–8. The '076 and '151 patents depict a screw thread attachment at Figure 1 and a ball-and-socket attachment at Figure 4, both reproduced below:

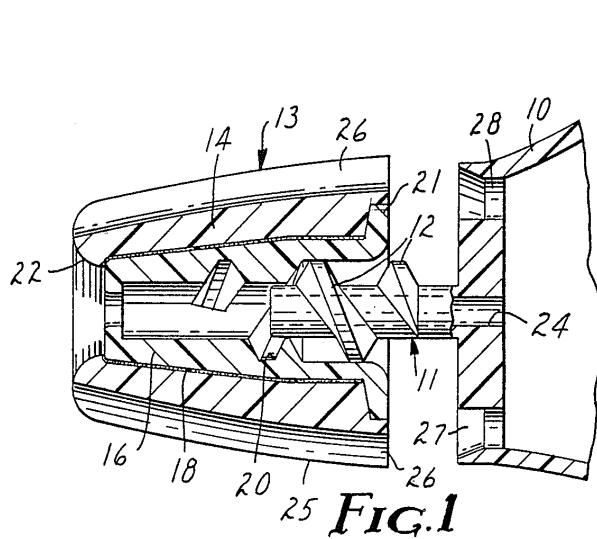


FIG. 1

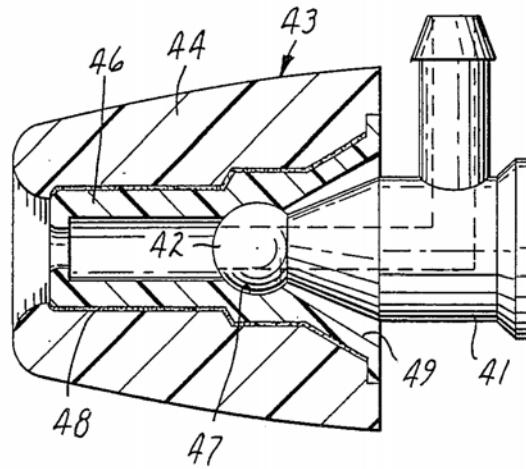
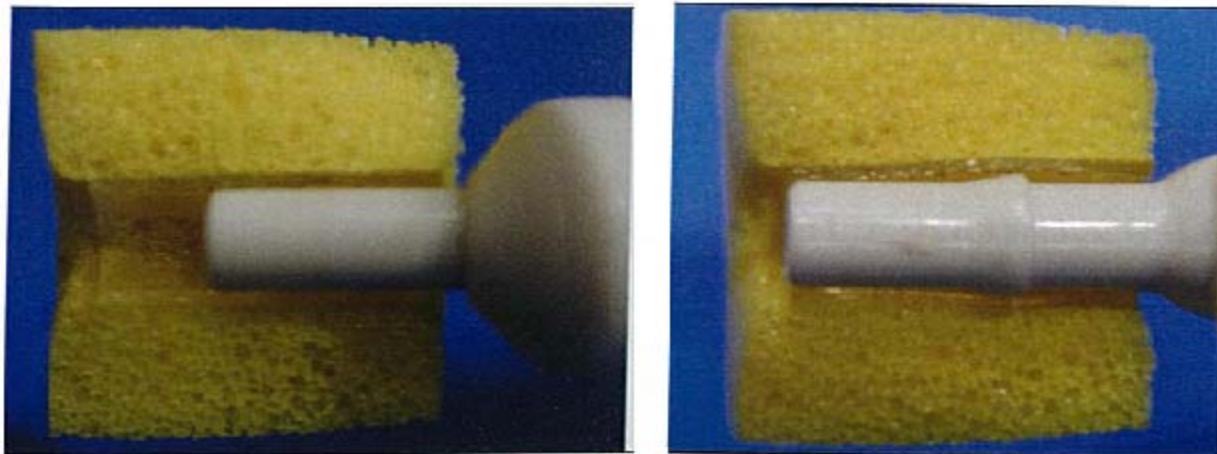


FIG. 4

In Figures 1 and 4, the ear piece is represented by numerals 11 and 41, respectively. The sleeves, 13 and 43, each include an elongated plastic duct, 16 and 46. In Figure 1, the “attaching means” consists of screw threads 12, and in Figure 4, it consists of ball 42 and socket 47. The parties had agreed that none of Shure's accused devices contained a structure identical to screw threads, a bayonet/ball-and-socket attachment, or a layer of adhesive cement. Id. at *8. However, Hearing Components had argued, and the jury had found, that both the straight and barbed nozzles were equivalent to a screw thread or a ball-and-socket attachment. Id. Representative examples of Shure's straight- and barbed-nozzled earphones, inserted in ducts of cross-sectioned foam

sleeves, as shown in Shure's brief, are depicted below.* The straight-nozzled earphone is on the left, and the barbed-nozzled earphone is on the right.



Shure's Br. 7. Shure's products include a plastic duct that is glued to a foam sleeve. Shure's straight nozzle is attached by interference fit into the duct, i.e., the outer diameter of the nozzle is larger than the inner diameter of the duct. The duct is therefore stretched outward when the nozzle is inserted, and friction holds the nozzle inside the duct. Similarly, Shure's barbed nozzle is attached to the duct by interference fit, but the nozzle also includes a protrusion, or barb, molded out of the same piece of plastic, to increase the friction holding the duct on the nozzle.

Focusing on equivalence, the district court held that Shure's straight-nozzled products did not infringe the asserted claims, but that its barbed-nozzled products did. The court found the evidence legally insufficient to support the jury's finding of infringement by Shure's straight-nozzled products. The court reasoned that Shure's straight-nozzled products were not equivalent to the disclosed structures of a screw or ball-and-socket attachment, even though they performed the claimed function of

* To better correspond to the figures in the patents, the orientation of the photographs has been flipped to the mirror image of those in the briefs.

attaching the end of the duct to the ear piece in such a way that it can easily be removed and discarded by the user so that another sleeve can be attached. Infringement Opinion, 2009 U.S. Dist. Lexis 17163 at *11–12. According to the court, unlike the claimed attaching and fastening means, the interference fit was not a protuberance, snap connection, adhesion, or any other positive attachment that would keep the duct and ear piece connected. Id. at *13–14.

Nevertheless, the district court denied JMOL with respect to Shure's barbed-nozzled products. According to the court, Shure's barbed nozzle has a protuberance, the barb, that is a structure to perform the claimed function. Id. at *15–16. Thus, the court held that the jury was justified in finding infringement by the barbed nozzled earphones. Id.

In a separate opinion released on the same day, the district court denied Shure's motion for JMOL of invalidity of the '076 and '151 patents. Validity Opinion, 2009 U.S. Dist. Lexis 17168. Shure had asserted invalidity based on U.S. Patents 2,325,590 ("Carlisle"), Re 29,487 ("Gardner"), 4,677,679 ("Killion"), and 4,122,841 ("Rock"). Shure had argued that the asserted claims were obvious based on one or more of three combinations of prior art: (1) Carlisle and Gardner, (2) Carlisle and Killion, and (3) Killion and Rock. Id. at *7–8. The court reasoned that, despite those three combinations of prior art, and given that no other combinations were presented in detail, the jury had had sufficient evidence to find the asserted claims nonobvious. Id. at *8. According to the court, the parties had presented conflicting, credible evidence on whether the references contained all of the limitations of the claims, on motivation to combine, and on secondary considerations of nonobviousness. Id. at *14–19. For example, Hearing

Components' expert, Dr. Chasin, had rebutted the testimony of Shure's expert, Dr. Wood, by stating that the prior art combinations were missing certain claim limitations. Id. at *17. Similarly, Dr. Chasin had rebutted Dr. Wood's testimony on motivation to combine, testimony the court found "rather sparse, and lacking in specific details." Id. at *17–19. Further, according to the court, the jury could have weighed the conflicting experts' credibility and found Dr. Chasin more credible, especially given his greater familiarity with the prior art devices and personal knowledge of Killion, the inventor of one of the prior art devices. Id. at *19–22.

In addition, in January 2009, the district court determined that the '076 and '151 patents were not subject to a laches defense. J.A. 4940–49. The court found that Shure had not pointed to any evidence, other than evidence of delay, that was missing but could have been found if Hearing Components had brought its suit earlier. Id. at 4942 II.9–12 ("[Shure's] laches defense would have been better if [Hearing Components] had filed earlier and there had been no laches. If there had been no laches, then [Shure] would have been able to prove laches easier. It becomes almost circular."). On economic prejudice, the court first discussed the presumption of economic prejudice that arises after a six-year delay in filing suit. Id. at 4943 II.6–24. In this case, Hearing Components had waited exactly six years minus one day, from the date it should have known of Shure's alleged infringement to the date it filed suit. Id. The court thus declined to presume economic prejudice but also found that, even if Shure had been given the presumption, Shure had not incurred any losses by the delay in filing suit. Id. at 4943 I.25–4948 I.24. Instead, the court noted, Shure's damages case had pointed out how little Shure thought it benefitted from the patented technology,

when Shure had known about the patents long before suit was filed. *Id.* The court thus found that Shure had shown no economic prejudice and was not entitled to prevail on its laches defense.

Hearing Components timely appealed from the district court's decisions finding the '920 patent indefinite and granting JMOL of noninfringement of the '072 and '151 patents with respect to the straight-nozzled earphones. Shure cross-appealed from the court's denial of JMOL of noninfringement of the '076 and '151 patents with respect to the barbed-nozzled earphones and its denial of JMOL of invalidity and determination of no laches for those patents. We have jurisdiction pursuant to 28 U.S.C. § 1295(a)(1).

DISCUSSION

A. The '920 Patent

Hearing Components argues that the district court erred in finding claims 1 and 2 of the '920 patent indefinite. According to Hearing Components, the phrase "readily installed and replaced by a user" is not ambiguous, as a person of ordinary skill in the art would know that it means "simple to install, without tools or specialized skills." Hearing Components contends that the specification disparages the prior art that required a tool and touts that the invention requires no tools. According to Hearing Components, the specification does not suggest that a person must have a certain level of physical disability to be the claimed "user," and although the '920 patent describes that the invention benefits older persons, the patent does not distinguish the prior art on that basis.

Hearing Components also argues that the "readily installed" phrase is not a claim limitation that required construction at all, as it is in the preamble and is not an essential

component of the invention. According to Hearing Components, the phrase is duplicative of other language in the claim, and the prosecution history does not clearly distinguish the invention on the basis of the preamble language.

Shure responds that the “readily installed” phrase is indefinite, as nothing in the specification or prosecution history of the ’920 patent clarifies the claim scope. According to Shure, the use of subjective terms such as “readily” renders a claim indefinite. Shure asserts that it presented unrebutted testimony that the art has no commonly understood definition of the word “readily.” Shure also argues that the “readily installed” term is a claim limitation at least because Hearing Components relied on it to distinguish prior art during prosecution and in the specification.

Finally, Shure asserts that Hearing Components never presented the claim construction to the district court that it now proposes on appeal, as it previously argued for the definition “easily placed on and taken off the tube.” According to Shure, Hearing Components also first suggested that the limitation was part of the preamble in a footnote to its claim construction reply brief. Hearing Components replies that there was no waiver, as its proposed construction is similar to the one presented to the district court. Hearing Components also replies that the court specifically considered whether the phrase was a limitation or part of the preamble.

We agree with Hearing Components that the claim limitation “readily installed and replaced by a user” is not indefinite. “A determination that a patent claim is invalid for failing to meet the definiteness requirement in 35 U.S.C. § 112, [paragraph] 2 is a legal question reviewed de novo.” Young v. Lumenis, Inc., 492 F.3d 1336, 1344 (Fed. Cir. 2007). A patent is presumed to be valid, so Shure faces an evidentiary burden of

clear and convincing evidence to show facts supporting a conclusion of invalidity. Id. at 1345.

As an initial matter, the “readily installed” phrase is a claim limitation, as Shure argues. A preamble to a claim may or may not be limiting, depending on the circumstances. “In considering whether a preamble limits a claim, the preamble is analyzed to ascertain whether it states a necessary and defining aspect of the invention, or is simply an introduction to the general field of the claim.” Computer Docking Station Corp. v. Dell, Inc., 519 F.3d 1366, 1375 (Fed. Cir. 2008) (quotation marks omitted). A term is often limiting when the patentee has relied on it during prosecution to distinguish prior art, as such reliance demonstrates that the feature disclosed in the preamble is necessary to the patentability of the claim. See id.; Jansen v. Rexall Sundown, Inc., 342 F.3d 1329, 1333 (Fed. Cir. 2003). In this case, Hearing Components clearly relied on the “readily installed” phrase during prosecution to distinguish prior art. See J.A. 5768 (“The Moser et al device clearly lacks (1) a ‘disposable wax guard’ that is (2) ‘readily installed and replaced by a user’ . . . as expressly called for in applicant’s claim 1.”); J.A. 5769 (The membrane in the Siemens device “is not ‘readily installed and replaced’; indeed, it apparently remains in place, where it is cleaned ultrasonically.”); J.A. 5770 (In the Oliveira device, “the sleeve is certainly not intended to be ‘readily installed and replaced,’ . . . as specifically called for by applicant’s claim 1.”). We do not consider the “readily installed” phrase to be duplicative of other language in the claim. Although the claim recites a membrane “that permits a user to position [a] guard over [an] outlet port,” the “readily installed” phrase refers to the entire wax guard and

therefore is more limiting. We thus conclude that the “readily installed” phrase is a claim limitation.

However, Hearing Components correctly asserts that the limitation is not indefinite. Under 35 U.S.C. § 112, second paragraph, the “specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention,” which is known as the definiteness requirement. “Claims are considered indefinite when they are not amenable to construction or are insolubly ambiguous. Thus, the definiteness of claim terms depends on whether those terms can be given any reasonable meaning. Indefiniteness requires a determination whether those skilled in the art would understand what is claimed.” Young, 492 F.3d at 1346 (internal citations and quotations marks omitted). The purpose of the definiteness requirement is to ensure that “the claims, as interpreted in view of the written description, adequately perform their function of notifying the public of the scope of the patentee’s right to exclude.” Honeywell Int’l, Inc. v. Int’l Trade Comm’n, 341 F.3d 1332, 1339 (Fed. Cir. 2003) (quotation marks omitted).

Here, the district court noted that the patentee has used a word of degree, “readily.” “[A] patentee need not define his invention with mathematical precision in order to comply with the definiteness requirement.” Invitrogen Corp. v. Biocrest Mfg., L.P., 424 F.3d 1374, 1384 (Fed. Cir. 2005) (quotation marks omitted). Not all terms of degree are indefinite. However, the specification must “provide[] some standard for measuring that degree.” Datamize, LLC v. Plumtree Software, Inc., 417 F.3d 1342, 1351 (Fed. Cir. 2005) (quotation marks omitted). Although “readily” does not refer to a mathematical measure of degree, in Datamize, we addressed the “purely subjective”

claim term “aesthetically pleasing” and stated that, as with terms of degree, “a court must determine whether the patent’s specification supplies some standard for measuring the scope of the phrase. Thus, we next consult the written description.” Id.

As the district court correctly noted, the written description of the ’920 patent states that one of the advantages of the wax guard is that it “requires no tools for installation or removal.” ’920 patent col.2 ll.6–9. Indeed, that statement appears in the context of the following two sentences: “It is simple to install, easy to remove, and convenient to replace, even for older persons. The guard is inexpensive and requires no tools for installation or removal.” Id. Assuming the patentee intended the second sentence to elaborate on the first sentence, a wax guard that is “inexpensive and requires no tools for installation or removal” will be “simple to install, easy to remove, and convenient to replace, even for older persons.” Id. That assumption is supported by the repetition of variations on the words “install” and “remove” in both sentences. Furthermore, given that the words “readily,” “simpl[y],” “eas[ily],” and “convenient[ly]” are all synonyms, the language of those two sentences in the specification closely tracks the language of the disputed claim term, “readily installed and replaced by a user.” Thus, the written description gives a clear example of a wax guard that is “readily installed and replaced by a user”: one that “is inexpensive and requires no tools for installation or removal.”

The district court was also correct in noting that the specification discusses the phrase “readily installed and replaced by a user” in the context of prior art. The specification disparages prior art guards that were not “readily installed and replaced.” It states that some prior art inventions “have mechanically mounted screens or other

filters beyond the sound delivery tube opening, but removal and replacement has been difficult, especially since persons wearing hearing aids are often advanced in years and unable either to see clearly enough or to perform fine physical actions well enough to replace the filters.” ’920 patent col.1 ll.62–68. By negative implication, the patent thus explains that a filter that must be mounted beyond the sound delivery tube opening is not “readily installed and replaced.”

Those two examples are the only examples or discussion provided by the specification of the “readily installed” phrase. Although the court cited parts of the written description discussing “prior products [that] needed a tool or solvent to remove wax buildup,” Claim Construction Opinion, slip op. at 12 (citing ’920 patent col.1 ll.50–60), that discussion is irrelevant to the wax guard because the tools and solvents that removed wax buildup were not used for “install[ing]” or “replac[ing]” a wax guard on the prior art products; they were simply used to clean parts of the products. See ’920 patent col.1 ll.43–44 (discussing “a hearing aid through which solvent may be pumped to remove wax buildup”); id. at col.1 ll.51–62 (discussing prior art patents that discussed previous prior art, but not giving a reason for “the apparent difficulty in replacing [previous prior art wax filters] after they are soiled” and describing only a reusable wax guard in which “ear wax is removed by pushing a tool through [a] cross passage”).

The district court found the “readily installed” phrase indefinite because the written description did not address the level of physical disability required by the terms “older persons” and persons “advanced in years [who are] unable either to see clearly enough or to perform fine physical actions well enough to replace the filters.” Claim Construction Opinion, slip op. at 12–13. However, the specification is clear in its

examples. Those examples apply, irrespective of the age or level of disability in the user, because the patent merely uses age and disability as possible factors exacerbating the difficulty for some users. See id. (“[R]emoval and replacement has been difficult, especially since persons wearing hearing aids are often advanced in years” (emphases added)); id. at col.2 ll.6–9 (“It is simple to install, easy to remove, and convenient to replace, even for older persons.” (emphasis added)). The examples are intended to apply to all users. The specification states that a guard that “is inexpensive and requires no tools for installation or removal,” id. at col.2 ll.6–9, is “readily installed and replaced,” and that a filter that must be mounted beyond the sound delivery tube opening, id. at col.1 ll.62–68, is not “readily installed and replaced.” Thus, the court was incorrect in its conclusion that “the specification provides no boundaries as to what ‘readily installed and replaced by a user’ can be.” Claim Construction Opinion, slip op. at 13. The specification clearly “supplies some standard for measuring the scope of the phrase.” Datamize, 417 F.3d at 1351.

Finally, we need not address Shure’s waiver argument, as we decline to construe the claim in the first instance. We therefore reverse the district court’s determination that claims 1 and 2 of the ’920 patent are indefinite and remand for adjudication of the issues relating to the ’920 patent. The court can use its own discretion as to whether further construction of the “readily installed” phrase is required, but the distinction in the specification between the ability of a layperson user to install the wax guard without tools, on the one hand, and the necessity of a professional using tools, on the other hand, requires reversal of the indefiniteness holding.

B. The '076 and '151 Patents

1. Infringement

Hearing Components contends that the district court erred in granting JMOL of noninfringement of the '076 and '151 patents by Shure's straight-nozzled earphones, and Shure contends that the court erred in denying JMOL of noninfringement by Shure's barbed-nozzled earphones. Specifically, Hearing Components argues that the jury properly found that Shure's straight nozzles infringe as an equivalent structure to the disclosed structures of screw threads and a ball-and-socket attachment. According to Hearing Components, the straight nozzle contains sufficient structure—the outer portion of the nozzle which deforms the duct—to perform the attachment function. Hearing Components argues that Shure chose the outside diameter of the nozzle specifically to maintain attachment with the duct and sleeve. Hearing Components also argues that the jury heard substantial evidence to support an infringement finding, as Hearing Components' expert, Dr. Chasin, testified that those of ordinary skill in the art would have known that a straight nozzle was interchangeable with a screw or a ball-and-socket attachment. Hearing Components asserts that it also showed that a broad range of equivalents was contemplated and claimed and that Shure's structures easily fit within that range.

Shure responds that no reasonable jury could have found that Shure's straight-nozzled earphones use the claimed attaching or fastening means. According to Shure, Dr. Chasin merely testified that he believed the structures to be equivalent but made no particularized comparison between the structures disclosed in the '076 and '151 patents and Shure's nozzle. Further, Shure argues that the inventors of the '076 and '151

patents were aware of attachment structure alternatives to screw threads and ball-and-socket connections but chose not to disclose them, favoring a finding of noninfringement. According to Shure, the inventors distinguished a frictional attachment in the patent and during prosecution. Shure asserts that there is no broad range of equivalents, as the only relevant comparison is between the accused structure and the disclosed structure, and Hearing Components never even argued that Shure's nozzles are equivalent to adhesive.

Shure further argues that substantial evidence could not support the jury's conclusion of infringement because Shure's straight nozzles have no positive attachment to the sleeves. Shure asserts that the attaching means limitation requires a female structure in the duct of the foam sleeve that mates with a male structure on the outer surface of the nozzle. Thus, according to Shure, the straight nozzles do not attach in the same "way" as the disclosed structures. In reply to that argument, Hearing Components argues that neither the claims nor the court's construction has any requirement of female matching.

As for Shure's argument that the court erred in denying JMOL of noninfringement by Shure's barbed-nozzled products, Shure specifically argues that no reasonable jury could have found that Shure's barbed-nozzled earphones use an equivalent to the disclosed structures for the claimed attaching or fastening means. According to Shure, the same reasons that straight nozzles do not infringe also apply to Shure's barbed nozzles. Like the straight nozzles, the barbed nozzles also work through a friction fit, and the foam sleeves are the same, with no female mating structure.

Hearing Components responds that, in addition to the reasons it gave for the straight nozzle infringing, the barbed nozzle has an additional attaching or fastening structure in the barb. Thus, Hearing Components asserts that the court properly denied JMOL of noninfringement by Shure's barbed-nozzled products.

We agree with Hearing Components that substantial evidence supported the jury's verdict that both Shure's straight- and barbed-nozzled products infringed the asserted claims. We review a grant or denial of JMOL without deference to the district court. Ericsson, Inc. v. Harris Corp., 352 F.3d 1369, 1373 (Fed. Cir. 2003); see Cambridge Toxicology Group v. Exnicios, 495 F.3d 169, 179 (5th Cir. 2007). Entry of JMOL is appropriate only if the jury's verdict is unsupported by substantial evidence or premised on incorrect legal standards. Odetics, Inc. v. Storage Tech. Corp., 185 F.3d 1259, 1266 (Fed. Cir. 1999); see Cambridge Toxicology Group, 495 F.3d at 179.

The jury found that Shure's products infringed the asserted claims. A determination of infringement requires a two-step analysis. "First, the court determines the scope and meaning of the patent claims asserted [Second,] the properly construed claims are compared to the allegedly infringing device." Cybor Corp. v. FAS Techs., Inc., 138 F.3d 1448, 1454 (Fed. Cir. 1998) (en banc) (citations omitted). Step one, claim construction, is an issue of law that we review de novo. Id. at 1456. In this case, the parties do not dispute the court's claim construction, in which the court determined that the attaching or fastening means limitations are written in means-plus-function format and that the corresponding structures are screw threads, a ball-and-socket attachment, a layer of adhesive, and their equivalents.

Step two, determining “[w]hether an accused device infringes a § 112, ¶ 6 claim as an equivalent[,] is a question of fact.” Odetics, 185 F.3d at 1268. In order to establish infringement of a means-plus-function term, Hearing Components must show that “the relevant structure in the accused device perform[s] the identical function recited in the claim and [is] identical or equivalent to the corresponding structure in the specification.” Id. at 1267 (citations omitted). The assertedly equivalent structure must “perform[] the claimed function in substantially the same way to achieve substantially the same result as the corresponding structure described in the specification.” Id. at 1268. We agree with Hearing Components that the jury permissibly found that the interference fit of Shure’s straight nozzle is equivalent to the screw threads or ball-and-socket attachment disclosed in the specification. As Hearing Components points out, the outer surface of the nozzle, which maintains an attachment with the duct through friction, is itself a structure. Contrary to the district court’s JMOL decision, we conclude that the claimed attaching or fastening means does not require a protuberance, snap connection, adhesion, or any other positive attachment with the duct. Infringement Opinion, 2009 U.S. Dist. Lexis 17163 at *14. Indeed, the only “positive attachment” provided by an adhesive, which the court found to be a corresponding structure, is increased friction.

We have stated that “[e]vidence of known interchangeability between structure in the accused device and the disclosed structure has . . . been considered an important factor” in determining equivalence. IMS Tech., Inc. v. Haas Automation, Inc., 206 F.3d 1422, 1435 (Fed. Cir. 2000). As Hearing Components demonstrates, the jury heard evidence that an interference fit was known at the time of the invention to be

interchangeable with screw threads or a ball-and-socket attachment. See J.A. 3434–43 (Dr. Oliveira, one of the inventors of the '076 and '151 patents, testified while looking at notes from the time of invention that, in the course of patenting the attaching or fastening means, the inventors considered an interference fit, a screw thread, a barb, a ball-and socket, and adhesives as “different ways of putting [the sleeve] on [the nozzle] practically and taking it off.”); J.A. 3770 (Dr. Chasin testified that Shure’s straight nozzle is not “significantly different or substantially different than . . . a screw thread. . . . [T]he patent holders when they wrote the patent . . . contemplated a very broad patent with many different possible implementations, many possible means. And we’ve already heard . . . that not even all of them were placed in the patent itself.”). Shure attempts to convert known interchangeability into a factor weighing against equivalence by stating that the inventors were aware of alternatives to the disclosed structures but chose not to disclose them. However, that is necessarily the case with known interchangeability, which nevertheless can support a finding of equivalence.

We further agree with Hearing Components that the straight nozzle “performs the claimed function in substantially the same way to achieve substantially the same result as” a screw thread or a ball-and-socket attachment. Odetics, 185 F.3d at 1268. Neither party disputes that the straight nozzle performs the same function “of attaching the end of the duct to the ear piece in such a way that it can easily be removed and discarded by the user so that another sleeve can be attached” to achieve substantially the same result. Infringement Opinion, 2009 U.S. Dist. Lexis 17163 at *11. Shure asserts that the straight nozzle does not perform the function “in substantially the same way” as the disclosed structures because Shure’s straight nozzle has no male structure on its outer

surface that mates with a female structure within the duct to form a positive attachment; instead the nozzle is smooth. However, as stated above, no positive male structure is required by the attaching or fastening means; indeed, adhesive is one of the disclosed structures, and it has no positive male structure. For the same reason, a female structure in the sleeve is also not required by the claims. Shure cites our opinion in Cortland Line Co. v. Orvis Co., 203 F.3d 1351, 1359 (Fed. Cir. 2000), for the proposition that “a mere interference fit does not ‘connect’ in substantially the same way, *i.e.*, threadably lock” and that an “interference fit differs significantly from a threaded connection.” However, an infringement analysis is fact-specific, and in Cortland Line, unlike in this case, one of the desired results was preventing rotation. Id. Additionally, in that case, our “review of the record disclose[d] no evidence suggesting structural equivalency.” Id. In this case, on the other hand, Hearing Components has presented such evidence in the form of testimony.

As for Shure’s argument that the inventors distinguished a frictional attachment in the patent specification and during prosecution, looking at the specification and prosecution history, we disagree. Shure points to the statement in the specification that Gardner, a prior art reference, “does not indicate how the plug is prevented from remaining in the ear canal if the tubular tip portion is accidentally dislodged or simply pulled out.” ’076 patent col.2 ll.2–5; ’151 patent col.2 ll.7–10. Shure asserts that Gardner uses a frictional attachment, so the patentees necessarily disavowed the use of a frictional attachment. However, such a reading strains the specification’s language as well as the language of Gardner. Gardner does not describe how the tip portion is held onto the sound conducting tube. The quoted language from the specification of the

'076 and '151 patents therefore simply requires an attachment that is strong enough to prevent the sleeve from remaining in the ear canal when the nozzle is removed, and it says nothing about a frictional attachment. Similarly, Shure points to a statement in the prosecution history that

[a]pplicants' ear piece component has means on the exterior surface of the connecting portion for disposably attaching the duct of the sleeve to the connecting portion. [U.S. Patent 3,169,600 to Thomas] at best only identifies a detachable receiving (col. 2, line 71 of Thomas '600) of the cushion 46 on ear plug 42. The reliability of such "detachable receiving" is not a concern of Thomas because Thomas' cushion 46 is intended to rest against the ear of the listener, not be compressed and inserted into the ear canal of the listener. Applicants need a disposable attachment in order to minimize detachment from the ear piece component of their compressed sleeve inside the ear canal.

J.A. 5534 (emphases in original). As with Gardner, the applicants simply disparaged Thomas's lack of attention to the attachment between the nozzle and the sleeve. The applicants did not disparage a frictional attachment or any other specific type of attachment.

Finally, because we have determined that substantial evidence supported the jury's verdict that Shure's straight-nozzled earphones infringe the asserted claims, we agree with the district court that substantial evidence also supported the jury's verdict with respect to the barbed-nozzled earphones. Indeed, the barbed nozzles have an additional structure of a barb for performing the attaching or fastening function.

We therefore conclude that substantial evidence supported the jury's verdict of infringement for both types of products. We reverse the district court's grant of JMOL that Shure's straight-nozzled products do not infringe, and we affirm the court's denial of JMOL that Shure's barbed-nozzled products infringe.

2. Validity

Shure argues that the district court should have granted JMOL that the '076 and '151 patents were obvious based on one or more of three combinations of prior art: (1) Carlisle and Gardner, (2) Carlisle and Killion, and (3) Killion and Rock. According to Shure, the Carlisle reference teaches all of the limitations of the claims except the use of slow-recovery foam, which is taught in Gardner and Killion. Shure argues that Carlisle teaches an "ear piece" inside the ear canal and a flexible user-disposable ball-and-socket connected duct. Also, Shure contends that Killion teaches all of the limitations except the use of mating male and female connecting features, which are taught by Carlisle. Shure argues that Killion discloses a "hearing aid" with an "ear piece" including a short section of tubing, a "flexible duct," and a "user-disposable sleeve." Further, according to Shure, Rock teaches the use of a barb, like Shure's barbed nozzle, so Shure is practicing the prior art. Shure asserts that Hearing Components never disputed the teachings of Gardner or Rock, and that Dr. Chasin's testimony distinguishing Carlisle and Killion contradicts the express teachings of those references.

Shure also contends that the district court erred by requiring a motivation to combine prior art references, contrary to KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398 (2007). According to Shure, it would have been obvious and predictable to make the above modifications to the prior art. Shure asserts that one of ordinary skill would have known that using a foam sleeve with Carlisle would improve sound isolation and comfort. Further, according to Shure, Dr. Oliveira, one of the inventors of the '076 and '151 patents, admitted that by 1986, others had used foam in earphones. Finally, Shure

argues that secondary considerations of nonobviousness suggest that the patents would have been obvious. According to Shure, there is no nexus between commercial success and the patented products. Indeed, Shure argues, the inventors admitted that their product was commercially unappealing. Shure also asserts that there is no evidence of unexpected results.

Hearing Components responds that Carlisle does not suggest a sound isolating seal or a sleeve that is replaced by the user rather than a professional, and that Shure offered no credible evidence that such modifications were sought. Hearing Components also asserts that Carlisle's ear piece is not inside the ear canal. According to Hearing Components, Killion is not even a hearing device but a diagnostic device operated by a professional, and it has no ear piece inserted into a sleeve.

Hearing Components also argues that the district court's jury instructions were in accordance with KSR, and Shure did not object to them. Hearing Components asserts that the court, in its opinion, similarly considered recognition of the problem and predictability of the results. According to Hearing Components, Shure provided little analysis for its position, and Hearing Components' expert, Dr. Chasin, had far more experience than Shure's expert. Hearing Components argues that, other than conclusory testimony, Shure offered no evidence to show predictability of the results of combining the prior art. Indeed, Hearing Components argues, the inventors were not addressing any known problem. According to Hearing Components, no one expected that a duct would prevent the sleeve from remaining in the ear when the hearing aid was removed. Further, Hearing Components asserts that there was no evidence of motivation to combine prior art references. Finally, Hearing Components argues that

there was considerable evidence of secondary considerations of nonobviousness that supported the jury's verdict, including a successful commercial licensing program. According to Hearing Components, its licensing fees declined significantly after the patents expired, showing a nexus between the patents and the value of the patented device.

We agree with Hearing Components that the district court correctly denied JMOL, upholding the jury's verdict that the '076 and '151 patents were not obvious. "We review the jury's conclusions on obviousness, a question of law, without deference, and the underlying findings of fact, whether explicit or implicit within the verdict, for substantial evidence." Johns Hopkins Univ. v. Datascope Corp., 543 F.3d 1342, 1345 (Fed. Cir. 2008) (quotations omitted). We agree with the district court that the jury heard substantial evidence to support a finding of nonobviousness. As the court emphasized, in order for a party to meet its burden of proving obviousness by "clear and convincing" evidence, the specific evidence must have been presented to the jury. Validity Opinion, 2009 U.S. Dist. Lexis 17168 at *10–14. As the court found, the jury heard conflicting testimony from Drs. Chasin and Wood on whether the prior art references contained all of the claim limitations, on motivation to combine, and on secondary considerations of nonobviousness. Id. at *14–19.

For example, Dr. Chasin testified that "Carlisle's device was not inserted into the ear canal, but instead just 'goes into the outside or the proximal end of the eartip.'" Id. at *16 (quoting J.A. 4653 l.20–54 l.25) (footnote omitted). Shure does not dispute that the asserted claims all require an ear piece inside the ear canal but argues that Carlisle teaches such an ear piece in its "small ear tip duct 74 fitting and engaging the entrance

portion of the ear canal 75" and its claimed "duct extensions [that are] designed to form part of a hollow ear tip member shaped and arranged to fit into the ear canal." Carlisle p.4 col.2 ll.46–48; id. at p.6 col.2 ll.16–19. However, Dr. Chasin testified that the actual ear piece of Carlisle was not designed to sit inside the ear canal, but instead only the molded duct went into the ear canal. J.A. 4653 ll.16–18. Indeed, as shown in figure 14 of Carlisle, the outlet duct 73 does not extend through the molded duct 74 to sit inside the ear canal. Carlisle Fig. 14; p.4 col.2 ll.44–48. As Dr. Chasin explained, at the time Carlisle's device was invented in the 1940s, there would have been no reason to place the ear piece, including the outlet duct 73, into the ear canal because "it was conventional not to have an earplug that would have to seal up the ear." J.A. 4655 ll.3–5; see id. at 4655 l.5–4656 l.4. Thus, the jury heard substantial evidence in Dr. Chasin's testimony that Carlisle does not teach an ear piece inside the ear canal. Because Carlisle was the primary reference in two of the three asserted combinations of prior art, and because Shure relied on Carlisle to teach the ear piece inside the ear canal, a finding of nonobviousness was permissible on those two combinations of references.

We also agree with the district court that substantial evidence supported a conclusion that Killion would not have been combined with either Carlisle or Rock to produce the claimed device because Dr. Chasin testified that Killion described a device that was "used to test hearing, rather than to improve the quality of sound." Validity Opinion, 2009 U.S. Dist. Lexis 17168 at *17 (citing J.A. 4646 l.18–4653 l.1). Although, as Shure points out, our law does not require an explicit teaching, suggestion, or motivation to combine prior art references, see KSR, 550 U.S. at 419–22, it may nevertheless be "important to identify a reason that would have prompted a person of

ordinary skill in the relevant field to combine the elements in the way the claimed new invention does,” id. at 418. See Takeda Chem. Indus. v. Alphapharm Pty., Ltd., 492 F.3d 1350, 1356–57 (Fed. Cir. 2007). In this case, where Dr. Wood gave testimony that was “rather sparse, and lacking in specific details,” and Dr. Chasin described particular reasons why one skilled in the art would not have been motivated to combine the references, we agree with the district court that substantial evidence supported a finding of nonobviousness. See Validity Opinion, 2009 U.S. Dist. Lexis 17168 at *17–19.

Dr. Chasin also testified that Killion did not teach an ear piece or a user-disposable sleeve. Id. (citing J.A. 4646 I.23–4657 I.9; J.A. 4651 II.9–22). Dr. Chasin testified that the part in Killion that Dr. Wood had called the ear piece could not go anywhere near the ear. J.A. 4649 I.19–4650 I.17. Furthermore, although Killion teaches that the “tube-plug combination shown in Fig. 1 is easily disposable,” Killion col.4 II.48–49, Dr. Chasin provided substantial evidence for the jury to conclude that an audiologist, rather than a user, is required to replace the ear piece, J.A. 4651 II.9–22. Indeed, as Dr. Chasin testified, Killion’s device was designed for an audiologist to test a patient’s hearing, so there would be no reason for the patient to be able to remove and dispose of the ear piece. See Killion col.4 II.49–50 (The disposable tube-plug combination “may be sterilized and packaged for use in the sterile field in the surgical operating room.”). We therefore agree that substantial evidence supported the jury’s conclusion that the asserted claims were not rendered obvious by the third asserted combination of prior art, as Shure relied on Killion to teach the ear piece and the user-disposable sleeve.

Finally, we agree with the district court that Hearing Components provided substantial evidence in the form of secondary considerations of nonobviousness. Hearing Components relied on the commercial success of its licensing program. As Shure argues, Hearing Components must show a “nexus between the merits of the claimed invention and evidence of secondary considerations . . . in order for the evidence to be given substantial weight in an obviousness decision.” Muniauction, Inc. v. Thomson Corp., 532 F.3d 1318, 1327 (Fed. Cir. 2008) (quotation marks omitted). However, Hearing Components showed such a nexus in that the licensing fee for a covered product was more than cut in half immediately upon the expiration of the ’151 patent, supporting its contention that the success of the device was related to the patent. J.A. 3620 II.1–23.

We therefore agree with Hearing Components that the district court correctly denied JMOL and upheld the jury’s verdict of nonobviousness as legally permissible and supported by substantial evidence.

3. Laches

Finally, Shure argues that the district court abused its discretion in determining that laches did not apply. Shure asserts that the court erred by ignoring prejudice arising from the laches defense itself. According to Shure, this court has found prejudice based solely on harm in establishing a laches defense. Here, Shure argues, more evidence could easily have established at least one more day of delay, which would have then invoked the presumption of laches. Shure also asserts that it demonstrated economic prejudice, in that its sales of accused products increased over time. According to Shure, the court improperly looked for evidence of the money Shure

invested in the accused products, when capital investment is not required to show economic prejudice.

Hearing Components responds that the district court clearly stated that, even if the presumption of laches applied, Hearing Components had rebutted it. Thus, according to Hearing Components, the court effectively gave Shure the benefit of the presumption. Hearing Components also asserts that, in finding no economic prejudice, the court permissibly found that Shure would not have behaved differently if it had been sued earlier, as Shure had relied on noninfringement opinions of counsel. Thus, according to Hearing Components, the absence of capital investment was only one component of the court's analysis.

We agree with Hearing Components that the district court did not abuse its discretion in finding no laches. "The application of the defense of laches is committed to the sound discretion of the district court." A.C. Aukerman Co. v. R.L. Chaides Constr. Co., 960 F.2d 1020, 1032 (Fed. Cir. 1992) (en banc). To prevail on a defense of laches, Shure must prove two elements: (1) Hearing Components delayed filing suit for an unreasonable and inexcusable length of time from the time it knew or reasonably should have known of its claim against Shure, and (2) the delay operated to the prejudice or injury of Shure. Id. Hearing Components' delay is measured from the time it knew or reasonably should have known of Shure's alleged infringing activities to the date of suit. Id. A delay of more than six years raises a presumption of prejudice. Wanlass v. Gen. Elec., 148 F.3d 1334, 1338 (Fed. Cir. 1998) (citing A.C. Aukerman, 960 F.2d at 1035-36). That presumption shifts to Hearing Components the burden of producing evidence

that would show either that Hearing Components' delay was reasonable under the circumstances or that Shure suffered neither economic nor evidentiary prejudice. Id.

In this case, the district court correctly found that a presumption of prejudice did not apply, and that even if the presumption had applied, it had been rebutted, as there was neither economic nor evidentiary prejudice to Shure. Indeed, Shure had proven a delay of six years minus a day, which technically does not invoke the presumption of prejudice. However, even giving Shure the presumption of prejudice because "maybe as a matter of equity it should have" applied, the court permissibly found that Hearing Components had proven that Shure had suffered neither economic nor evidentiary prejudice. J.A. 4943 II.16–24.

Regarding evidentiary prejudice, Shure asserts that because of the delay in suit, evidence of further delay to prove the laches defense itself was lost. Id. at 4941 I.25–4942 I.23. But evidentiary prejudice must consist of some separate disadvantage resulting from the delay, such as loss of records, unavailability of evidence, etc., that prevents a party from proving a separate claim or defense. If the only missing evidence is evidence of further delay, that does not amount to a showing of evidentiary prejudice. In this case, any loss of evidence that would have shown further delay is irrelevant because the court applied the presumption of prejudice as if such a delay had been proven. Thus, Shure would have gained no benefit from having evidence that would have shown an even longer delay.

We also agree with Hearing Components that the district court permissibly found no economic prejudice, having shifted the burden of production to Hearing Components. Even though, as Shure argues, capital investment is not required to show economic

prejudice, our cases have required at least increased expenditures by the defendant in reliance on the delay. See ABB Robotics, Inc. v. GMFanuc Robotics Corp., 52 F.3d 1062, 1065 (Fed. Cir. 1995) (agreeing that “increasing sales without additional evidence of capital investments may constitute economic prejudice” but that alleged infringers had “to prove that their increased expenditures, *i.e.*, on marketing and development, were in [some] way related to actions taken by the patentee.”). “The proper inquiry is whether there has been a ‘change in the economic position of the alleged infringer during the period of delay.’” Id. (quoting A.C. Aukerman, 960 F.2d at 1033).

Shure knew about the patents in suit long before suit was filed, and the court permissibly found that Shure had relied on noninfringement opinions of counsel, such that it would not have acted differently if it had been sued earlier. Indeed, the court discussed Shure’s position that its products’ value did not arise from the use of the claimed invention. The court also analyzed Shure’s actions over the course of the nearly six-year delay, which lacked significantly increased expenditures based on the use of the claimed invention. J.A. 4944 l.13–4948 l.17. Shure did incur increased damages because of the delay in its being found to have infringed Hearing Components’ patent, but it did not prove that it was unable to respond in damages to compensate for that infringement. It is not economic prejudice to pay damages from infringing sales of products generating a profit over a longer period of time resulting from delay. See A.C. Aukerman, 960 F.2d at 1033 (“[Economic] damages or monetary losses are not merely those attributable to a finding of liability for infringement. Economic prejudice would then arise in every suit.” (citation omitted)). Shure did not prove its inability to respond in greater damages resulting from the delay. Thus, the

court permissibly found that Hearing Components had proven no change in Shure's economic position based on the delay in filing suit. We therefore affirm the court's finding of no laches.

CONCLUSION

We have considered the parties' remaining arguments and do not find them persuasive. Accordingly, the judgment of the district court is

AFFIRMED IN PART, REVERSED IN PART, and REMANDED

COSTS

Costs to Hearing Components.