

**United States Court of Appeals  
for the Federal Circuit**

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**CORDIS CORPORATION,**  
*Plaintiff-Appellant,*

v.

**BOSTON SCIENTIFIC CORPORATION  
AND BOSTON SCIENTIFIC SCIMED, INC.  
(FORMERLY KNOWN AS SCIMED LIFE SYSTEMS, INC.),**  
*Defendants-Cross Appellants.*

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2010-1311, -1316

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Appeals from the United States District Court for the District of Delaware in case no. 98-CV-0197, Judge Sue L. Robinson.

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Decided: September 28, 2011

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GREGORY L. DISKANT, Patterson Belknap Webb & Tyler LLP, of New York, New York, argued for plaintiff-appellant. With him on the brief were EUGENE M. GELERNTER, SCOTT B. HOWARD, IRENA ROYZMAN, CHARLES D. HOFFMANN.

FRANK P. PORCELLI, Fish & Richardson P.C., of Boston, Massachusetts, argued for defendants-cross appellees.

lants. With him on the brief were LAUREN A. DEGNAN and CHERYLyn ESOY MIZZO, of Washington, DC.

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Before BRYSON, MAYER, and GAJARSA\*, *Circuit Judges*.  
GAJARSA, *Circuit Judge*.

Cordis Corporation (“Cordis”) appeals the United States District Court for the District of Delaware’s grant of judgment as a matter of law (“JMOL”) that Boston Scientific Corporation and Boston Scientific Scimed, Inc. (collectively, “BSC”) do not literally infringe claim 25 of U.S. Patent No. 5,879,370. Cordis also appeals the district court’s denial of JMOL on the issue of non-infringement by the reverse doctrine of equivalents. BSC cross-appeals the district court’s judgment that U.S. Patent Nos. 5,643,312 (the “312 patent”) and 5,879,370 (the “370 patent”) are not unenforceable due to inequitable conduct. For the reasons stated below, we affirm.

#### BACKGROUND

This dispute relates to balloon-expandable stents, devices which are used to treat occluded blood vessels. We have previously summarized the importance of such stents:

The development of balloon-expandable coronary stents marked a significant advance in the treatment of coronary artery disease by providing an alternative to balloon angioplasty and bypass surgery. In balloon angioplasty, an inflated balloon crushes built-up plaque against the arterial wall to improve blood flow. The balloon is withdrawn at the end of the procedure, however, which allows

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\* Circuit Judge Gajarsa assumed senior status on July 31, 2011.

the artery to close again over time. A stent of the sort disclosed in the patents at issue in this case is mounted on an angioplasty balloon and is forced to expand against the arterial walls when the balloon is inflated. When the balloon is deflated and withdrawn, the stent retains its shape and remains in the artery to keep it open.

*Cordis Corp. v. Medtronic AVE, Inc.*, 339 F.3d 1352, 1354-55 (Fed. Cir. 2003). Both of the patents at issue are directed to, *inter alia*, stents having undulating longitudinal sections.

On February 25, 1994, Robert E. Fischell and two of his sons, David R. Fischell and Tim A. Fischell, filed U.S. Patent Application No. 08/202,128 (the “128 application”), which ultimately issued as the ’312 patent. For the first two years after the ’128 application was filed, Robert Fischell prosecuted the application *pro se*. He did, however, retain an attorney, Morton J. Rosenberg, to prosecute foreign counterparts.<sup>1</sup>

On July 17, 1995, Mr. Rosenberg forwarded to Robert Fischell a “Search Report from the European Patent Office” (“EPO Search Report”) regarding a European counterpart to the ’128 application. The EPO Search Report identified six references, and categorized them according to relevance. Category “X” documents were “particularly relevant if taken alone,” category “Y” documents were “particularly relevant if combined with another document of the same category,” and category “A” documents were “technological background.” J.A. 11523. Only one reference, European Patent Application 566807

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<sup>1</sup> At the time the ’128 application was filed, Robert Fischell had personally prosecuted more than twenty patents. Mr. Rosenberg was substituted as the attorney prosecuting the ’128 application in February 1996.

(“Sgro”), was identified as a category X reference. In an accompanying letter, Mr. Rosenberg explained:

the only reference which is stated as being particularly relevant to Claim 1 is European Patent Application # 566807 whose inventor is Jean-Claude Sgro. We have made a Patentee Search to determine whether we have any corresponding Patent in the United States but have come up negatively. It may pay us to make a translation from the French to determine if this is relevant.

J.A. 11946.

As in the original ’128 application, the only claim in the European application that mentioned undulating longitudinals was claim 8. The EPO Search Report identified four “Y” references as being relevant to that claim. Among the references so identified was U.S. Patent No. 4,856,516 (“Hillstead”), a patent directed to, *inter alia*,

[a] stent for reinforcing a vessel within a subject comprising a cylindrical support dimensioned to fit within an interior of said vessel constructed from an elongated wire *bent to define a series of relatively tightly spaced convolutions or bends*, said wire also bent in the form of a plurality of loops . . . .

Hillstead, col.4 ll.37-42 (emphasis added). Figure 2A from Hillstead, also displayed on the cover page of that patent, is reproduced below, along with Figure 8 from the ’312 patent for comparison.

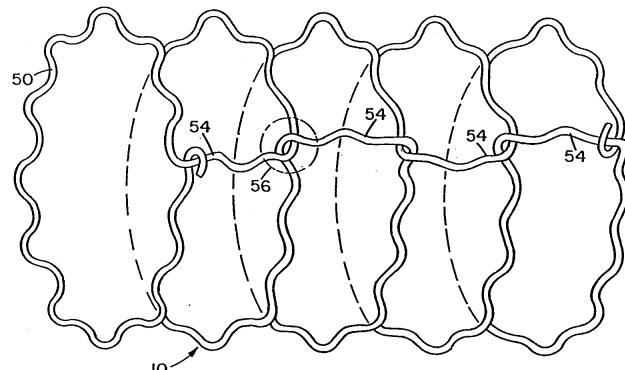


FIG. 2A

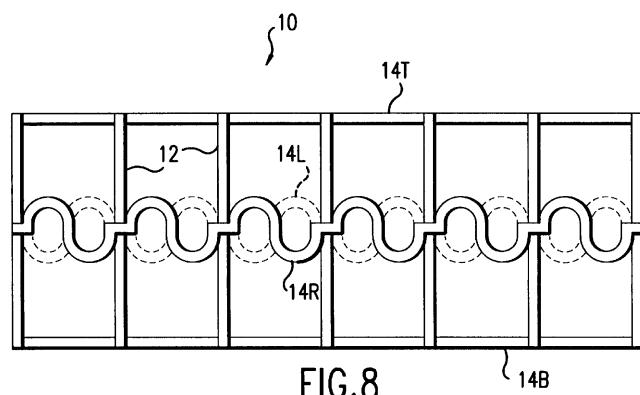


FIG. 8

In the course of this case, Mr. Rosenberg testified it was his practice to “carefully” review the “X” references in EPO search reports, i.e., those that—like Sgro—are “particularly relevant if taken alone.” *Cordis Corp. v. Boston Scientific Corp.*, 641 F. Supp. 2d 353, 355-56 (D. Del. 2009) (“*Cordis III*”). But his practice was to “just scan” “Y” references, i.e., those that—like Hillstead—are “particularly relevant if combined with another document of the same category.” *Id.* Similarly, Robert Fischell testified it was his practice to “look at the pictures and see if the pictures [in the references] look like the invention, the inventive concept for which we’re trying to get claims.” Bench Trial Tr. 846:1-17; *see also* Bench Trial Tr.

845:10-16, 852:7-24. Nevertheless, both Mr. Rosenberg and Robert Fischell testified that they did not recall looking at Hillstead until April 1998, even though it was identified in the EPO Search Report and both had retained copies of Hillstead in their files since at least July 1995. Not surprisingly, Hillstead was never disclosed to the U.S. Patent and Trademark Office in the course of the '312 patent's prosecution, despite multiple amendments adding limitations regarding undulations and the importance given those undulations in distinguishing various prior art references.<sup>2</sup>

Just prior to the July 1, 1997, issuance of the '312 patent, the Fischells filed U.S. Patent Application 08/864,221 ("the '221 application") as a continuation of the '128 application. Robert Fischell was thereafter shown a copy of Hillstead during a meeting with Cordis's counsel.<sup>3</sup> Robert Fischell testified that this meeting—apparently in April 1998—was the first time he specifically recalled seeing Hillstead.

In May 1998, an information disclosure statement ("IDS") regarding the '221 application was filed with the Patent and Trademark Office. The IDS cited forty-one U.S. patents, seven foreign patent documents, and thirteen articles. Hillstead, along with the other three "Y"

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<sup>2</sup> Of relevance here, the Fischells specifically distinguished U.S. Patent No. 5,269,802 ("Garber") as lacking "the undulating shape or contour" in the longitudinals of their own claimed invention. J.A. 254-55. The Fischells similarly distinguished other references as not providing "the undulating sections of each longitudinal structure being of a generally curved shape." J.A. 235-36.

<sup>3</sup> Through a series of transactions in 1998 and 1999, Cordis acquired various assets of the Fischells' company, IsoStent, and agreed to assume certain of IsoStent's obligations to the Fischells.

references from the EPO Search Report, was included in the disclosure. Among the seventy references ultimately identified, Hillstead was never emphasized as being of particular interest. The '221 application subsequently issued as the '370 patent, with Hillstead among the "References Cited" on the face of the patent.

The present litigation began on October 3, 1997, when Cordis filed suit against Medtronic AVE, Inc., BSC, and Scimed Life Systems, Inc. As relevant to this appeal, Cordis ultimately accused BSC's NIR stent of infringing the '312 and '370 patents. Following a multi-week trial, a jury found that BSC's NIR stent does not literally infringe claim 21 of the '312 patent, and claim 21 is not invalid for obviousness or lack of written description. *Cordis Corp. v. Medtronic AVE, Inc.*, 194 F. Supp. 2d 323, 339 (D. Del. 2002) ("Cordis I"). It also found that the NIR stent literally infringes claims 25 and 26 of the '370 patent, but no infringement of either claim by virtue of the reverse doctrine of equivalents. *Id.* Moreover, it determined that claim 25 of the '370 patent is not invalid for lack of written description, but claim 26 of the '370 patent is invalid for lack of written description. *Id.*

Both parties moved for JMOL. The district court granted BSC's motion for JMOL that the NIR stent does not literally infringe claims 25 and 26 of the '370 patent. *Id.* at 354. Consequently, Cordis's motion for JMOL on the reverse doctrine of equivalents was denied as moot. *Id.* BSC's motion for JMOL that claim 25 of the '370 patent and claim 21 of the '312 patent are invalid for lack of written description was also denied. *Id.* at 354-55.

Following the jury trial, the district court conducted a four-day bench trial on the issue of unenforceability due to inequitable conduct. BSC contended that the patentees failed to disclose Hillstead during the prosecution of the

'312 patent, and the patentees knew, or should have known, that Hillstead would be material to the examiner's consideration of patentability. *Id.* at 362. After making findings of fact, the district court concluded BSC proved "by clear and convincing evidence the threshold levels of materiality and intent with respect to nondisclosure of the Hillstead patent" during the prosecution of the '312 patent. *Id.* at 367. The court found "[t]he patentees purposefully neglected their responsibility of candor to the PTO by 'putting their heads in the sand' regarding prior art related to [undulating longitudinals]." *Id.* The court then concluded that the '370 patent's prosecution was tainted by the lack of candor in the '312 prosecution because, when the patentees finally disclosed Hillstead, they did so in the midst of numerous other references and without identifying it as being of particular interest. *Id.* at 368. The district court therefore held both patents unenforceable due to inequitable conduct. *Id.*

Both parties appealed. Cordis challenged the portions of the judgment relating to literal infringement, the reverse doctrine of equivalents, and unenforceability, all with respect to the '370 patent. *Cordis Corp. v. Boston Scientific Corp.*, 188 F. App'x. 984, 985 (Fed. Cir. 2006) ("*Cordis II*"). On the issue of unenforceability, this court agreed that the Hillstead reference was material, but remanded for additional findings regarding intent to deceive. *Id.* at 986. We therefore declined to reach the issues of literal infringement and reverse doctrine of equivalents. *Id.* at 985. BSC cross-appealed from the portion of the judgment holding the '370 patent not invalid, but we affirmed the district court on that issue. *Id.*

On remand, the district court made additional findings, but concluded "[u]pon further reflection, the

evidence of record that tends to support a finding of deceptive intent is not clear and convincing.” *Cordis III*, 641 F. Supp. 2d at 358. Because it found “the inferences argued by [Cordis] are supported by evidence of record and are as reasonable as those inferences argued by [BSC],” the district court concluded “it would be clear error . . . to imbue [Fischell’s and Rosenberg’s] conduct with deceptive intent . . . .” *Id.* at 359. The court went on to note that, even had it concluded otherwise, BSC “failed to prove, by clear and convincing evidence, that the nondisclosure of Hillstead during the ’312 prosecution carried over and affected the later ’370 patent prosecution” so as to taint the latter. *Id.* In short, neither patent was unenforceable by reason of inequitable conduct. Following the district court’s denial of BSC’s motion for reconsideration, *Cordis Corp. v. Boston Scientific Corp.*, No. 98-197, 2010 WL 1286424 (D. Del. Mar. 31, 2010) (“*Cordis IV*”), the parties renewed their remaining arguments on appeal.<sup>4</sup>

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<sup>4</sup> Returning to this court for a second time, this case is but one installment—albeit, at nearly fourteen years, perhaps the longest—in an ongoing and epically expensive litigation saga known as the “Stent Wars.” E.g., Barnaby J. Federer, *Keeping Arteries Cleared and the Courts Clogged*, N.Y. TIMES, Oct. 4, 2007, at C1; see also *Spectralytics, Inc. v. Cordis Corp.*, --- F.3d ---, 2011 WL 2307402 (Fed. Cir. June 13, 2011); *Boston Scientific Corp. v. Johnson & Johnson*, 647 F.3d 1353 (Fed. Cir. 2011); *Cordis Corp. v. Boston Scientific Corp.*, 561 F.3d 1319 (Fed. Cir. 2009); *Boston Scientific Scimed, Inc. v. Cordis Corp.*, 554 F.3d 982 (Fed. Cir. 2009); *Cordis Corp. v. Medtronic AVE, Inc.*, 511 F.3d 1157 (Fed. Cir. 2008); *Advanced Cardiovascular Sys., Inc. v. Medtronic Vascular, Inc.*, 182 F. App’x. 994 (Fed. Cir. 2006); *Cordis Corp. v. Boston Scientific Corp.*, 99 F. App’x. 928 (Fed. Cir. 2004); *Scimed Life Sys., Inc. v. Johnson & Johnson*, 87 F. App’x. 729 (Fed. Cir. 2004); *Cordis Corp. v. Medtronic*

## DISCUSSION

## I.

We turn first to the issue of infringement. The infringement analysis is a two step inquiry. “First, the court determines the scope and meaning of the patent claims asserted, and then 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) (internal citations omitted).

On appeal, only dependent claim 25 of the ’370 patent is at issue with respect to JMOL of no infringement. That claim, along with independent claim 22 on which it depends, reads:

22. A pre-deployment balloon expandable stent structure adapted for percutaneous delivery to the curved coronary arteries, the stent structure being generally in the form of a thin-walled metal tube having a longitudinal axis, the stent structure having a multiplicity of closed perimeter cells, each cell having one or more *undulating* sections, each undulating section having a generally curved shape and having a first end point and a second end point wherein a line drawn from the first end point to the second end point is generally parallel to the stent’s longitudinal axis.

25. The stent of claim 22 wherein the *undulating* section of each closed perimeter cell comprises a “U” shaped curve.

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*AVE, Inc.*, 339 F.3d 1352 (Fed. Cir. 2003); *Advanced Cardiovascular Sys., Inc. v. Scimed Life Sys., Inc.*, 261 F.3d 1329 (Fed. Cir. 2001); *Medtronic, Inc. v. Advanced Cardiovascular Sys., Inc.*, 248 F.3d 1303 (Fed. Cir. 2001).

'370 patent col.6 ll.17-26, 35-36 (emphasis added).

During claim construction, the parties disputed whether the term “undulating” required both a crest *and* a trough, as opposed to a crest *or* a trough. *Cordis I*, 194 F. Supp. 2d at 353 n.22. Citing claim 25, Cordis argued that “undulating structures include those that have [only] a wave-like crest, and are not limited to structures that have both a crest and an associated trough.” J.A. 954, 1206. BSC, on the other hand, explicitly argued that “undulating” cannot simply mean “curved,” J.A. 1261, and instead “requires that a structure have both a ‘crest’ and a ‘trough,’” J.A. 1269. The district court embraced BSC’s proposed construction and construed “undulating” to mean “rising and falling in waves, thus having at least a crest and a trough.” *Cordis Corp. v. Boston Scientific Corp.*, No. 1:98-cv-197, Order at 2 (DE 154) (D. Del. Sept. 7, 2000).

As noted above, BSC moved for JMOL that the NIR stent does not literally infringe claim 25 of the '370 patent. Jury Trial Tr. 1576:2-1577:7. When the motion was subsequently renewed, BSC argued that “Cordis inappropriately altered the parties’ and the court’s understanding of the term ‘undulating’ and, under the intended construction of the term, the evidence presented at trial does not support a conclusion that the NIR stent contains ‘undulating’ sections.” *Cordis I*, 194 F. Supp. 2d. at 353. Agreeing with BSC, the district court clarified that its “use of the plural ‘waves’ implies a change in direction,” and entered JMOL that claim 25 was not infringed. *Id.* at 354. Cordis challenges the district court’s grant of JMOL on two grounds. First, Cordis argues that BSC improperly urged a narrower and erroneous claim construction on the district court. And second, even if the district court’s claim construction did imply “arcing curves” and “a change in direction,” Cordis argues that a reasonable jury

could still find that the NIR stent infringed claim 25. We treat each of Cordis's arguments sequentially.

#### A.

Cordis correctly notes that a party prevailing on an issue of claim construction cannot argue for a differing claim construction following an adverse jury verdict. *E.g., Hewlett-Packard Co. v. Mustek Systems, Inc.*, 340 F.3d 1314, 1320 (Fed. Cir. 2003) (citing *Interactive Gift Express, Inc. v. Compuserve, Inc.*, 256 F.3d 1323, 1345-46 (Fed. Cir. 2001)). The question here is whether BSC did, in fact, seek to alter the district court's claim construction. No rule of law restricted BSC from seeking to clarify or defend the original scope of its claim construction. *Interactive Gift Express*, 256 F.3d at 1346. Similarly, nothing prevented the district court from clarifying its previous construction of the term "undulating." See *Network Commerce, Inc. v. Microsoft Corp.*, 422 F.3d 1353, 1358 n.4 (Fed. Cir. 2005). But because BSC did not object to the court's jury instruction regarding the construction of the term "undulating," "[t]he verdict must be tested by the charge actually given [under] the ordinary meaning of the language of the jury instruction," *Hewlett-Packard*, 340 F.3d at 1321.

Cordis does not challenge the district court's construction of the term "undulating" as requiring "at least a crest and a trough." We therefore do not review the construction itself, and instead focus on what that construction means. Based on the ordinary meaning of the construction as given to the jury, it is apparent that the construction requires multiple "waves." See *Webster's Third New International Dictionary* 2586 (1968) (defining "wave" as "a shape or outline having successive curves like those of ocean waves: one of the crests of such a form or a crest with its adjacent trough"). Accordingly, the terms "crest"

and “trough,” as used in district court’s claim construction, implicate changes of direction, with the curve extending beyond the point of inflection. The district court’s post-verdict elaboration on this point only clarified what was inherent in the construction. Doing so was not error; it merely made plain what, as we detail below, should have been obvious to the jury.

We acknowledge that the terms “crest” and “trough” can, in some cases, merely indicate points on a curve. Here, however, we are not persuaded by Cordis’s citation to expert testimony and portions of dictionary entries defining a “crest” as, *inter alia*, “the top” or “highest point of the waveform.” So defined, the requirement in the construction for “both a ‘crest’ and a ‘trough’” becomes meaningless: every trough would necessarily include a “highest point” that would satisfy Cordis’s definition of “crest.” Indeed, Cordis’s expert testified as much:

Q. So does every letter U shape have two crests?

A. Well, I haven’t looked at every. I mean, some people’s handwriting is illegible and certainly doesn’t, but, yes.

Jury Trial Tr. 989:20-23. Cordis’s definition would thus impermissibly render superfluous the requirement for a “crest” in addition to a “trough.”

Our conclusion about the ordinary meaning of the jury instruction is bolstered by the parties’ arguments during claim construction. Accordingly, this is not a case where Cordis can plead surprise at the trial court’s clarification. Indeed, during the *Markman* phase, BSC raised claim construction arguments from which the district court’s understanding logically flows and which, indeed, mandate it. BSC specifically pointed to arguments made during the prosecution of the ’128 application in which the

Fischells’ “undulating” structure was distinguished from structures that were merely curved.<sup>5</sup> *Cordis Corp. v. Boston Scientific Corp.*, No. 1:98-cv-197, BSC Reply Br. in Support of Defendant’s *Markman* Memorandum at 4-8 (DE 133); *see also Markman* Hrg Tr. 37:23-39:19.

Claim terms must be construed in light of all of the intrinsic evidence, which includes not only the claim language and patent written description, but also the prosecution history. *ERBE Elektromedizin GmbH v. Canady Tech. LLC*, 629 F.3d 1279, 1284-85 (Fed. Cir. 2010). As noted by BSC, the Fischells traversed an anticipation rejection over U.S. Patent No. 5,269,802 (“Garber”), directed to a prostatic stent, by arguing that the invention disclosed in Garber lacked the “undulating shape or contour” required by the claims of their own invention. J.A. 255. Although the Fischells referred to the “connecting arms” in Garber as “substantially linearly directed,” J.A. 255, a cursory review of that patent shows the structures at issue have an obvious and defined curve, Garber Figs. 2, 3. Indeed, the Garber specification notes that “[i]n use, the pressure of the bladder neck against the branching [connecting] arms tends to arc the arms inward” resulting in “an hour glass shape.” Garber col.4 ll.5-7, col.5 ll.30-31. Cordis’s suggestion that a single curve can satisfy the “undulating” limitation of the asserted claims was thereby foreclosed. *See Elkay Mfg. Co. v. Ebco Mfg. Co.*, 192 F.3d 973, 979 (Fed. Cir. 1999) (not-

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<sup>5</sup> The argument in question was made in the course of the ’128 application, which resulted in the ’312 patent, while only the claims of the ’370 patent are at issue in this portion of the appeal. Arguments made in the course of prosecuting the ’128 application are relevant, however, because a disclaimer in the parent application carries forward into the construction of the same claim term in the child. *Verizon Servs. Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1306 (Fed. Cir. 2007).

ing that “[a]rguments made during the prosecution of a patent application are given the same weight as claim amendments”). That remains true whether Cordis couches its argument in terms of claim differentiation, the phrase “comprising a ‘U’ shaped curve,” or dictionary entries. *See, e.g., Free Motion Fitness, Inc. v. Cybex Int'l, Inc.*, 423 F.3d 1343, 1348-49 (Fed. Cir. 2005); *Seachange Int'l, Inc. v. C-COR, Inc.*, 413 F.3d 1361, 1372-73 (Fed. Cir. 2005); *Kraft Foods, Inc. v. Int'l Trading Co.*, 203 F.3d 1362, 1368 (Fed. Cir. 2000).

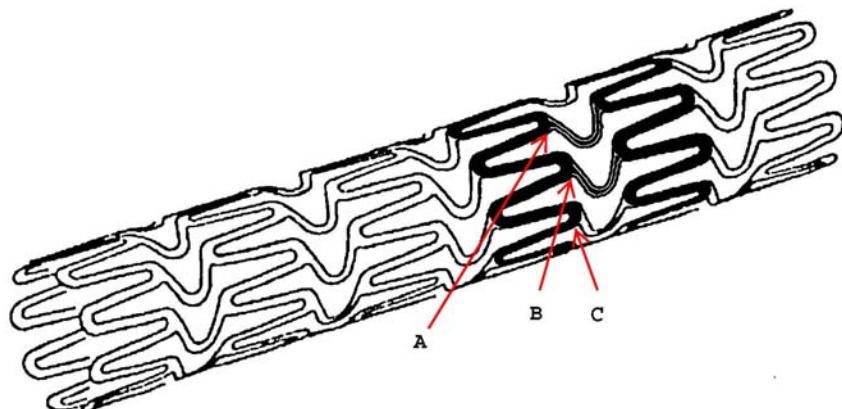
## B.

Having found no error in the district court’s clarification of its construction of the term “undulating,” we turn to the merits of its grant of JMOL that claim 25 was not infringed by BSC’s NIR stent. “This court reviews without deference a district court’s grant of JMOL under Federal Rule of Civil Procedure 50.” *LNP Eng’g Plastics, Inc. v. Miller Waste Mills, Inc.*, 275 F.3d 1347, 1353 (Fed. Cir. 2001). JMOL is appropriate when “a party has been fully heard on an issue during a jury trial and the court finds that a reasonable jury would not have a legally sufficient evidentiary basis to find for the party on that issue . . . .” Fed. R. Civ. P. 50(a)(1). In determining whether a reasonable jury would have a legally sufficient evidentiary basis for the facts as found, “we must presume that the jury resolved all factual disputes in favor of the prevailing party, and we must leave those findings undisturbed as long as they are supported by substantial evidence.” *Akamai Techs., Inc. v. Cable & Wireless Internet Servs., Inc.*, 344 F.3d 1186, 1192 (Fed. Cir. 2003). Substantial evidence requires more than a mere scintilla, however, and we must review the record as a whole, taking into consideration evidence that both justifies and detracts from the jury’s decision. *Id.*; *see also Johnson v. Campbell*, 332 F.3d 199, 204 (3d Cir. 2003) (“The question

is not whether there is literally *no evidence* supporting the unsuccessful party, but whether there is evidence upon which a reasonable jury could properly have found its verdict.” (internal quotations omitted)).

As did the district court, we focus on whether the NIR stent satisfies the “undulating sections” limitation of claim 25. Cordis identifies three categories of evidence supporting the jury verdict: the testimony of its expert, various photographs, and engineering drawings. Cordis Br. 48-50. BSC correctly argues that we must disregard the testimony of Cordis’s expert that the NIR stent has two crests and a trough because, as the quotation in Part II-A indicates, that testimony was based on an incorrect understanding of the claim construction. *See Frank’s Casing Crew & Rental Tools, Inc. v. PMR Techs., Ltd.*, 292 F.3d 1363, 1375 (Fed. Cir. 2002) (finding no evidence that a limitation was satisfied after noting that contrary testimony was based on an incorrect interpretation of a claim term).

Referencing the drawing below, copied from Cordis’s brief and extensively relied on by both parties, the NIR stent includes so-called C-loops stacked circumferentially about the stent body, with longitudinal members known as U-loops in between.



Cordis Br. 11; *see also* Jury Trial Tr. 1510:10-24. The drawing leaves unclear where the U-loops end and the C-loops begin. See Points A, B, and C, as labeled by this court. The photographs and engineering drawings in evidence are, however, more clear. In those renderings, if the width of the C-loops is treated as approximately constant, with the C-loops maintaining the same curvature as they display before the junction with the U-loops, the geometry resembles points B and C, rather than point A. *See, e.g.*, J.A. 12500-530. The U-loops thus merely level out, and they lack the change in direction required for literal infringement. We note that our conclusion is consistent with the testimony of Cordis's expert that the "[u]ndulating [section] is fitted onto the end of the ring," i.e., the C-loops, and is "[a] cup, a claw on the end of the . . . ring element." Jury Trial Tr. 986:21-987:18; *see also* Cordis Br. 48-49. It is also consistent with the testimony of BSC's expert that the U-loops include a trough, but no crest as that term was used in the claim construction. *See* Jury Trial Tr. 1625:7-21. It is not, however, consistent with the jury's verdict on literal infringement.

Indeed, absent the testimony of Cordis's expert regarding troughs and crests, and the corresponding testimony concluding infringement, we find very little

evidence to support the jury’s verdict that claim 25 was literally infringed. Substantial evidence, as required to support the jury’s verdict, demands more than a mere scintilla. *Johnson*, 332 F.3d at 204. We therefore affirm the district court’s grant of JMOL that claim 25 was not literally infringed. Consequently, we decline to reach the denial of Cordis’s motion for JMOL on the issue of non-infringement by the reverse doctrine of equivalents.

## II.

We turn next to BSC’s cross-appeal of the district court’s judgment that the ’312 and ’370 patents are not unenforceable due to inequitable conduct. BSC first argues that the enforceability of the ’312 patent is not properly before this court and, regardless, the trial court violated our mandate in *Cordis II* by revisiting the issue of unenforceability *vel non*. BSC also argues that the trial court’s findings in *Cordis III* are, on the merits, clearly erroneous. We address each in turn.

### A.

In its Corrected Reply Brief in *Cordis II*, Cordis stated that “the ’312 patent is *not* being asserted by Cordis and its enforceability is *not* the subject of this appeal. This appeal concerns a different and separate patent — the ’370 patent.” Cordis *Cordis II* Corrected Reply Br. 1. BSC correctly suggests that this statement constitutes a waiver by Cordis of any challenge to the district court’s finding in *Cordis I* that the ’312 patent is unenforceable. BSC Br. 47-48. BSC errs, however, in concluding that the waiver rendered the associated judgment unreviewable.

This court properly reaches “waived” issues when they are necessary to the resolution of other issues directly before it on appeal. *See Pfizer, Inc. v. Teva Pharms. USA, Inc.*, 518 F.3d 1353, 1359 n.5 (Fed. Cir. 2008); *Long Island*

*Sav. Bank, FSB v. United States*, 503 F.3d 1234, 1244-45 (Fed. Cir. 2007); *see also* U.S. Supreme Ct. Rule 14.1(a) (“The statement of any question presented is deemed to comprise every subsidiary question fairly included therein.”). Applied here, we conclude that the enforceability of the ’312 patent was necessarily before this court in *Cordis II*.

In our previous opinion, we characterized Cordis as “challeng[ing] the district court’s conclusion that the patentees engaged in inequitable conduct during the prosecution of [the ’312 patent] that rendered the ’370 patent unenforceable.” *Cordis II*, 188 F. App’x. at 985. Consistent with that characterization, both parties addressed the issues of materiality and intent to deceive, but they did so *only with respect to the ’312 patent prosecution*. *Cordis Cordis II* Br. 53-66; BSC *Cordis II* Br. 23-39. To be sure, the parties also addressed potential taint of the ’370 patent prosecution, but only subsequent to far more extensive arguments regarding the conduct of the ’312 prosecution. *Cordis Cordis II* Br. 67-69; BSC *Cordis II* Br. 39-43. Moreover, neither party has suggested that the ’370 patent is unenforceable independent of the enforceability of its parent. We therefore regard the enforceability of the two patents as inextricably linked, with the enforceability of the ’312 patent a predicate issue necessary to our determination of the enforceability of the ’370 patent. *See Therasense, Inc. v. Becton, Dickinson & Co.*, --- F.3d ---, 2011 WL 2028255, at \*8 (Fed. Cir. May 25, 2011) (en banc); *cf. City of Sherill v. Oneida Indian Nation of New York*, 544 U.S. 197, 214 n.8 (2005) (noting that the case was resolved “on considerations not discretely identified in the parties’ briefs” because those considerations were “inextricably linked to, and thus fairly included within, the questions presented” (internal quotation omitted)).

## B.

BSC next argues that the district court violated our mandate in *Cordis II* by reconsidering its finding of intent to deceive. Our review of the district court's actions implicates the scope and interpretation of our mandate, which we review without deference. *See Engel Indus., Inc. v. Lockformer Co.*, 166 F.3d 1379, 1382 (Fed. Cir. 1999).

In *Cordis II*, we stated that “[i]t is unclear to us precisely what the district court has found with regard to [Robert] Fischell’s and Mr. Rosenberg’s knowledge. In particular, we are uncertain whether the district court faulted [Robert] Fischell for merely failing to conduct a prior art search, or whether the district court faulted [him] for ‘cultivating ignorance’ with respect to the Hillstead reference.” 188 F. App’x. at 988 (quoting *FMC Corp. v. Hennessy Indus., Inc.*, 836 F.2d 521, 526 (Fed. Cir. 1987)). We therefore remanded “for the purpose of enabling the district court to provide more specific findings as to the state of knowledge of [Robert] Fischell and Mr. Rosenberg.” *Id.* In doing so, we instructed the district court to address “whether, in addition to reading the July 1995 letter from Mr. Rosenberg, [Robert] Fischell read the accompanying search report . . . and whether [Robert] Fischell read the Hillstead patent at that time.” *Id.*

On remand, the district court made detailed findings regarding the prosecution of the ’312 patent. *Cordis III*, 641 F. Supp. 2d. at 355-57. It did not, however, make the requested findings as to Robert Fischell’s actions and knowledge with respect to the search report and the Hillstead patent. Instead, the district court reversed its prior finding of specific intent to deceive, concluding that “the inferences argued by plaintiff are supported by

evidence of record and are as reasonable as those inferences argued by defendants,” and “it would be clear error . . . to imbue [Robert Fischell’s and Mr. Rosenberg’s] conduct with deceptive intent on this record.” *Id.* at 359 (referencing *Scanner Techs. Corp. v. ICOS Vision Sys. Corp.*, 528 F.3d 1365, 1376 (Fed. Cir. 2008)).

We find no error in the district court’s actions. Implicit in our request for additional findings was a conclusion that the findings before us were lacking. Rather than reversing the district court’s judgment, we requested specific findings on issues that we identified as outcome determinative. The district court’s subsequent conclusion that the record was insufficient to make the requested findings was entirely consistent with our mandate. For the same reason, our mandate must be read to have left unenforceability *vel non* an open issue. It would be illogical for this court to remand for findings on unresolved outcome determinative issues, while simultaneously foreclosing reconsideration of the outcome after the district court considered those issues for the first time.

### C.

Finally, BSC directly challenges the district court’s supplemental findings of fact and the resulting determination that the ’312 and ’370 patents are not unenforceable. BSC Br. 53-59. On appeal, “[w]e review the district court’s findings of fact for clear error and [its] ultimate determination of whether inequitable conduct occurred for abuse of discretion.” *Warner-Lambert Co. v. Teva Pharm. USA, Inc.*, 418 F.3d 1326, 1343 (Fed. Cir. 2005).

In *Therasense, Inc. v. Becton, Dickinson & Co.*, we made clear that a finding of inequitable conduct requires specific intent to deceive, and “to meet the clear and convincing evidence standard, the specific intent to deceive must be ‘the single most reasonable inference able to

be drawn from the evidence.” 2011 WL 2028255, at \*10 (quoting *Star Scientific, Inc. v. R.J. Reynolds Tobacco Co.*, 537 F.3d 1357, 1366 (Fed. Cir. 2008)). In light of this standard, we cannot agree that the district court’s supplemental findings were clearly erroneous or that its ultimate determination on inequitable conduct was an abuse of discretion.

The record reflects that in July 1995, Robert Fischell’s attorney forwarded him a copy of an EPO Search Report identifying Hillstead, as well as a copy of the Hillstead patent. The accompanying letter, however, drew attention to a different reference—Sgro—as the “only reference . . . being particularly relevant.” J.A. 11946. Robert Fischell consistently testified that, while he looked at the Sgro reference in 1995, he did not recall reviewing Hillstead until after the ’312 patent had issued. The district court explicitly found that no communications in the record called Hillstead to Fischell’s attention until after the ’312 patent issued, and that Fischell relied on his attorney’s advice vis-à-vis the EPO Search Report. Notably, when Hillstead was eventually brought to Fischell’s attention, he promptly disclosed it to the Patent and Trademark Office in connection with the ’370 prosecution, albeit without emphasis.

The district court ultimately concluded that “the evidence cited in support of finding inequitable conduct is not clearly more compelling than the evidence cited in support of not finding inequitable conduct.” *Cordis III*, 641 F. Supp. 2d at 359. On these facts, particularly the finding with respect to Robert Fischell’s reliance on Mr. Rosenberg’s advice, *id.* at 359 n.8, we do not find clear error in the district court’s conclusion that the evidence does not unequivocally demonstrate specific intent to

deceive.<sup>6</sup> We therefore affirm the district court’s conclusion that BSC failed to prove inequitable conduct in the ’312 and ’370 patent prosecutions.

#### CONCLUSION

We affirm the district court’s grant of judgment as a matter of law that claim 25 of the ’370 patent is not literally infringed by the NIR stent. We also affirm the district court’s conclusion that the ’312 and ’370 patents are not unenforceable due to inequitable conduct. As did the district court, we decline to reach Cordis’s appeal on the issue of reverse doctrine of equivalents because that issue is moot in light of our holding on literal infringement.

#### AFFIRMED

No costs.

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<sup>6</sup> This appears to be a case where BSC proved the threshold level of intent to deceive, but that proof was rebutted by Robert Fischell’s good faith explanation. See *Therasense*, 2011 WL 2028255, at \*10 (quoting *Star Scientific*, 537 F.3d at 1368). BSC’s argument therefore hinges, as it did below, on Robert Fischell’s credibility. Reviewing the record, we agree that there is substantial evidence calling into question Robert Fischell’s veracity. But it was the province of the district court to determine credibility, and “[t]his court gives great deference to the district court’s decisions regarding credibility of witnesses.” *Ecocolchem, Inc. v. S. Cal. Edison Co.*, 227 F.3d 1361, 1378-79 (Fed. Cir. 2000); see also *Anderson v. Bessemer City*, 470 U.S. 564, 575 (“[O]nly the trial judge can be aware of the variations in demeanor and tone of voice that bear so heavily on the listener’s understanding of and belief in what is said.”).