

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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AMAZON.COM, INC. and AMAZON.COM SERVICES LLC,  
Petitioners,

v.

COUNTERFLO AB,  
Patent Owner.

IPR2023-00362  
U.S. Patent No.: 8,791,829  
Issued: July 29, 2014  
Application No.: 11/885,697  
Filed: March 6, 2006

Title: VISUALISATION ARRANGEMENT

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**PETITION FOR**  
**INTER PARTES REVIEW OF U.S. PATENT NO. 8,791,829**

**TABLE OF CONTENTS**

|                                                                          | Page(s) |
|--------------------------------------------------------------------------|---------|
| TABLE OF AUTHORITIES .....                                               | vi      |
| LIST OF EXHIBITS.....                                                    | viii    |
| MANDATORY NOTICES UNDER 37 C.F.R. § 42.8 .....                           | x       |
| 1.    Real Party-In-Interest.....                                        | x       |
| 2.    Related Matters .....                                              | x       |
| 3.    Lead And Back-Up Counsel, And Service Information.....             | x       |
| I.    INTRODUCTION .....                                                 | 1       |
| II.    GROUND FOR STANDING PER SECTION 42.104(a).....                    | 1       |
| III.    IDENTIFICATION OF CHALLENGE .....                                | 2       |
| A.    Statement Of The Precise Relief Requested / Statutory Grounds..... | 2       |
| IV.    THE '829 PATENT .....                                             | 2       |
| A.    The Specification.....                                             | 3       |
| B.    The Claims .....                                                   | 6       |
| V.    STATE OF THE ART AND LEVEL OF SKILL IN THE ART .....               | 7       |
| A.    State Of The Art .....                                             | 7       |
| 1.    Measuring Current In A Cable.....                                  | 7       |
| a)    '829's Implied Admissions<br>About The State Of The Art .....      | 7       |
| b)    Multiple Current Sensors Were Well Known .....                     | 7       |
| c)    Borden And Godard Disclose Current Sensors .....                   | 8       |
| 2.    Visually Indicating Level Of Current In A Cable .....              | 10      |

|      |                                                                                                                                                |    |
|------|------------------------------------------------------------------------------------------------------------------------------------------------|----|
| a)   | Borden And Godard Disclose<br>Visually Indicating The Level Of Current.....                                                                    | 11 |
| 3.   | Linear Illumination Along a Cable, Including<br>Modulated Illumination To Indicate Signal Level.....                                           | 12 |
| a)   | '829's Admissions About The State Of The Art.....                                                                                              | 12 |
| b)   | Currie Discloses<br>Illuminating The Length Of A Cable .....                                                                                   | 13 |
| c)   | Jablonski And Erickson Disclose Modulating<br>Illumination Along The Length Of A Cable<br>To Indicate The Level Of A Signal In The Cable ..... | 14 |
| B.   | Person Of Ordinary Skill In The Art.....                                                                                                       | 16 |
| VI.  | CLAIM CONSTRUCTION .....                                                                                                                       | 16 |
| A.   | Proposed Constructions.....                                                                                                                    | 17 |
| 1.   | "Current" .....                                                                                                                                | 17 |
| 2.   | "Means for illumination when<br>energized to indicate an electrical quantity" .....                                                            | 18 |
| VII. | FOUNDATIONS 1 AND 2: CLAIMS 1-17 ARE ANTICIPATED<br>BY JABLONSKI OR, IN THE ALTERNATIVE,<br>OBVIOUS OVER JABLONSKI IN VIEW OF GODARD.....      | 20 |
| A.   | Jablonski.....                                                                                                                                 | 20 |
| B.   | Godard .....                                                                                                                                   | 24 |
| C.   | Combination Of Jablonski And Godard.....                                                                                                       | 26 |
| D.   | Motivation To Combine Jablonski<br>And Godard And Expectation Of Success .....                                                                 | 30 |
| E.   | Detailed Mapping Of Jablonski And Godard To Claims.....                                                                                        | 32 |
| 1.   | Claim 1 .....                                                                                                                                  | 32 |
| 2.   | Claim 2 .....                                                                                                                                  | 36 |

|     |                |    |
|-----|----------------|----|
| 3.  | Claim 3 .....  | 36 |
| 4.  | Claim 4 .....  | 36 |
| 5.  | Claim 5 .....  | 37 |
| 6.  | Claim 6 .....  | 37 |
| 7.  | Claim 7 .....  | 38 |
| 8.  | Claim 8 .....  | 39 |
| 9.  | Claim 9 .....  | 40 |
| 10. | Claim 10 ..... | 42 |
| 11. | Claim 11 ..... | 43 |
| 12. | Claim 12 ..... | 43 |
| 13. | Claim 13 ..... | 43 |
| 14. | Claim 14 ..... | 44 |
| 15. | Claim 15 ..... | 44 |
| 16. | Claim 16 ..... | 47 |
| 17. | Claim 17 ..... | 48 |

|       |                                                                                  |    |
|-------|----------------------------------------------------------------------------------|----|
| VIII. | GROUND 3: CLAIMS 1-5, 7-8, 14 ARE<br>OBVIOUS OVER BORDEN IN VIEW OF CURRIE ..... | 48 |
| A.    | Borden .....                                                                     | 48 |
| B.    | Currie .....                                                                     | 56 |
| C.    | Combining Borden and Currie .....                                                | 59 |
| D.    | Motivation To Combine Borden<br>And Currie And Expectation Of Success .....      | 60 |
| E.    | Detailed Mapping Of Borden And Currie To Claims .....                            | 63 |
| 1.    | Claim 1 .....                                                                    | 63 |
| 2.    | Claim 2 .....                                                                    | 66 |

|      |                                                                   |    |
|------|-------------------------------------------------------------------|----|
| 3.   | Claim 3 .....                                                     | 67 |
| 4.   | Claim 4 .....                                                     | 68 |
| 5.   | Claim 5 .....                                                     | 68 |
| 6.   | Claim 7 .....                                                     | 69 |
| 7.   | Claim 8 .....                                                     | 69 |
| 8.   | Claim 14 .....                                                    | 70 |
| IX.  | GROUND 4: CLAIMS 15 AND 17<br>ARE ANTICIPATED BY BORDEN .....     | 70 |
| A.   | Borden .....                                                      | 70 |
| B.   | Detailed Mapping of Borden to Claims .....                        | 71 |
| 1.   | Claim 15 .....                                                    | 71 |
| 2.   | Claim 17 .....                                                    | 73 |
| X.   | GROUND 5: CLAIMS 9-10, 12-14<br>ARE ANTICIPATED BY ERICKSON ..... | 73 |
| A.   | Erickson .....                                                    | 73 |
| B.   | Detailed Mapping Of Erickson To Claims .....                      | 76 |
| 1.   | Claim 9 .....                                                     | 76 |
| 2.   | Claim 10 .....                                                    | 77 |
| 3.   | Claim 12 .....                                                    | 77 |
| 4.   | Claim 13 .....                                                    | 78 |
| 5.   | Claim 14 .....                                                    | 78 |
| XI.  | NO OBJECTIVE INDICIA OF NON-OBVIOUSNESS .....                     | 79 |
| XII. | NO DISCRETIONARY GROUNDS FOR DENIAL .....                         | 82 |
| A.   | 325(d) .....                                                      | 82 |
| B.   | <i>Fintiv</i> .....                                               | 83 |

|                                |    |
|--------------------------------|----|
| XIII. CONCLUSION.....          | 85 |
| CERTIFICATE OF COMPLIANCE..... | 87 |
| CERTIFICATE OF SERVICE .....   | 88 |

**TABLE OF AUTHORITIES**

Page(s)

**Cases**

|                                                                                     |    |
|-------------------------------------------------------------------------------------|----|
| <i>In re Fox</i> ,<br>471 F.2d 1405 (C.C.P.A. 1973).....                            | 7  |
| <i>Novartis AG v. Torrent Pharm. Ltd.</i> ,<br>853 F.3d 1316 (Fed. Cir. 2017) ..... | 79 |
| <i>Phillips v. AWH Corp.</i> ,<br>415 F.3d 1303 (Fed. Cir. 2005) .....              | 17 |

**Board Decisions**

|                                                                                                                                |    |
|--------------------------------------------------------------------------------------------------------------------------------|----|
| <i>Apple Inc. v. Fintiv, Inc.</i> ,<br>IPR2020-00019, Paper 11 (Mar. 20, 2020) .....                                           | 83 |
| <i>Apple Inc. v. Seven Networks, LLC</i> ,<br>IPR2020-00180, Paper 12 (Aug. 14, 2020).....                                     | 84 |
| <i>Hulu, LLC, v. SITO Mobile R&amp;D, LLC</i> ,<br>IPR2021-00298, Paper 11 (May 19, 2021) .....                                | 85 |
| <i>Intex Recr. Corp. v. Team Worldwide Corp.</i> ,<br>IPR2018-00871, Paper 14 (Sept. 14, 2018).....                            | 83 |
| <i>Microsoft Corp. v. Parallel Networks Licensing, LLC</i> ,<br>IPR2015-00486, Paper 10, 2015 WL 4760578 (July 15, 2015).....  | 83 |
| <i>Sand Revolution II, LLC v. Continental Intermodal Group—Trucking LLC</i> ,<br>IPR2019-01393, Paper 24 (June 16, 2020) ..... | 84 |
| <i>Siemens Industry Software Inc. v. Synopsys Inc.</i> ,<br>IPR2021-01212, Paper 11 (Jan. 13, 2022) .....                      | 84 |

**Statutes**

|                       |        |
|-----------------------|--------|
| 35 U.S.C. § 102 ..... | passim |
| 35 U.S.C. § 103 ..... | 2      |

|                       |    |
|-----------------------|----|
| 35 U.S.C. § 112 ..... | 19 |
| 35 U.S.C. § 325 ..... | 82 |

**Other Authorities**

|                                                                             |        |
|-----------------------------------------------------------------------------|--------|
| <i>Interim Procedure for Discretionary Denials in AIA</i>                   |        |
| <i>Post-Grant Proceedings with Parallel District Court Litigation</i> ..... | 83, 84 |

**Rules**

|                          |    |
|--------------------------|----|
| 37 C.F.R. § 42.15 .....  | 2  |
| 37 C.F.R. § 42.24 .....  | 87 |
| 37 C.F.R. § 42.6 .....   | 88 |
| 83 Fed. Reg. 51340 ..... | 17 |

**LIST OF EXHIBITS**

| <b>EX No.</b> | <b>Description</b>                                                                                         |
|---------------|------------------------------------------------------------------------------------------------------------|
| 1001          | U.S. Patent No. 8,791,829 (“ <b>the ’829 patent</b> ”)                                                     |
| 1002          | Excerpts from the Prosecution File History of U.S. Patent No. 8,791,829 (“ <b>the ’829 file history</b> ”) |
| 1003          | Declaration of Gary L. Woods (“ <b>Woods</b> ”)                                                            |
| 1004          | Curriculum Vitae of Gary L. Woods                                                                          |
| 1005          | International Publication No. WO 2005/052443 to Jablonski (“ <b>Jablonski</b> ”)                           |
| 1006          | International Application No. PCT/AU2004/001664 (“ <b>Jablonski application</b> ”)                         |
| 1007          | U.S. Patent No. 7,324,006 to Godard (“ <b>Godard</b> ”)                                                    |
| 1008          | U.S. Patent Application No. 10/960,844 (“ <b>Godard application</b> ”)                                     |
| 1009          | U.S. Patent Application Publication No. 2005/0146827 to Borden et. al. (“ <b>Borden</b> ”)                 |
| 1010          | U.S. Patent Application No. 10/752,854 (“ <b>Borden application</b> ”)                                     |
| 1011          | U.S. Patent No. 7,233,086 to Borden et. al.                                                                |
| 1012          | U.S. Patent Application Publication No. 2005/0124209 to Currie et. al. (“ <b>Currie</b> ”)                 |
| 1013          | U.S. Patent Application No. 10/948,186                                                                     |
| 1014          | U.S. Patent No. 7,019,658 to Erickson et. al. (“ <b>Erickson</b> ”)                                        |
| 1015          | U.S. Patent Application No. 10/677,994 (“ <b>Erickson application</b> ”)                                   |
| 1016          | Excerpts from Rudolf F. Graf, Modern Dictionary of Electronics, Newnes (7th ed. 1999) (“ <b>Graf</b> ”)    |

| EX No. | Description                                                                                                                                                    |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1017   | Excerpts from McGraw-Hill Dictionary of Electrical and Computer Engineering, McGraw-Hill (2004) (“ <b>Dictionary of Electrical and Computer Engineering</b> ”) |
| 1018   | Excerpts from Julie K. Peterson, <i>Fiber Optic Illustrated Dictionary</i> , CRC Press (2003) (“ <b>Peterson</b> ”)                                            |
| 1019   | Excerpts from Jacob Fraden, <i>Handbook of Modern Sensors</i> , Springer (3rd ed. 2004) (“ <b>Fraden</b> ”)                                                    |
| 1020   | Excerpts from David R. Goff, <i>Fiber Optic Reference Guide</i> , Focal Press (3rd ed. 2002) (“ <b>Goff</b> ”)                                                 |
| 1021   | Excerpts from Stephen H. Lampen, <i>Wire, Cable, and Fiber Optics for Video &amp; Audio Engineers</i> , McGraw-Hill (1998) (“ <b>Lampen</b> ”)                 |
| 1022   | Excerpts from R.M. Marston, <i>Optoelectronics Circuits Manual</i> , Newnes (2nd ed. 1999) (“ <b>Marston</b> ”)                                                |
| 1023   | Excerpts from R.S. Popovic, <i>Hall Effect Devices</i> , Adam Hilger (1991) (“ <b>Popovic</b> ”)                                                               |
| 1024   | Excerpts from <i>Electrical, Measurement, Signal Processing, and Displays</i> , edited by John G. Webster, CRC Press (2004) (“ <b>Webster</b> ”)               |
| 1025   | Excerpts from Time Magazine’s “50 Best Inventions of 2010”                                                                                                     |
| 1026   | Allegro Microsystems ACS750xCA-050 Datasheet                                                                                                                   |
| 1027   | Triad Magnetics UL1560 Datasheet                                                                                                                               |

**MANDATORY NOTICES UNDER 37 C.F.R. § 42.8**

**1. Real Party-In-Interest**

The real-parties-in-interest are Amazon.com, Inc. and Amazon.com Services LLC.

**2. Related Matters**

The '829 patent (EX1001) has been asserted in the following litigations:

- *Counterflo AB v. Amazon.com, Inc. et al.*, Case No. 2:22-cv-00050 (E.D. Tex.), filed February 10, 2022; and
- *Counterflo AB v. Walmart Inc.*, Case No. 2:22-cv-00051 (E.D. Tex.), filed February 10, 2022.

**3. Lead And Back-Up Counsel, And Service Information**

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Petitioners consent to service via email at the above email addresses.

Pursuant to 37 C.F.R. § 42.10(b), concurrently filed with this Petition is a Power of Attorney executed by Petitioners and appointing the above counsel.

Amazon.com, Inc. and Amazon.com Services LLC (“Petitioners”) respectfully request *inter partes* review (“IPR”) of claims 1-17 of U.S. Patent No. 8,791,829 (the “’829 patent”) (EX1001), allegedly assigned to Counterflo AB (“Patent Owner”). For the reasons set forth below, these claims should be found unpatentable and cancelled.

## **I. INTRODUCTION**

Visually indicating the amount of current in an electrical cable was well known by 2005. So was illuminating the length of an electrical cable for safety, decorative, or diagnostic reasons, like indicating the characteristics of transmitted signals. Jablonski (EX1005) combined these ideas before the challenged ’829 patent and anticipates each challenged claim. Jablonski discloses measuring currents in an electrical conductor and, based on those measurements, varying the illumination of a linear lighting element extending along the electrical conductor. Other prior art references disclose and teach variations on these well-known concepts, forming additional grounds of unpatentability, as explained further below. Based on these grounds, the Board should institute IPR and cancel each challenged claim.

## **II. GROUND FOR STANDING PER SECTION 42.104(a)**

Petitioners certify that the ’829 patent is available for IPR and that Petitioners are not barred or estopped from requesting an IPR challenging the patent claims on this petition’s identified grounds.

### **III. IDENTIFICATION OF CHALLENGE**

#### **A. Statement Of The Precise Relief Requested / Statutory Grounds**

Petitioners request *inter partes* review of all claims (1-17) (the “Challenged Claims”) of the ’829 patent, on the following pre-AIA statutory grounds:

|                 | Reference(s)         | Basis           | Claims       |
|-----------------|----------------------|-----------------|--------------|
| <b>Ground 1</b> | Jablonski            | 35 U.S.C. § 102 | 1-17         |
| <b>Ground 2</b> | Jablonski and Godard | 35 U.S.C. § 103 | 1-17         |
| <b>Ground 3</b> | Borden and Currie    | 35 U.S.C. § 103 | 1-5, 7-8, 14 |
| <b>Ground 4</b> | Borden               | 35 U.S.C. § 102 | 15, 17       |
| <b>Ground 5</b> | Erickson             | 35 U.S.C. § 102 | 9-10, 12-14  |

For each ground, in Sections VII-X below, the petition presents evidence of unpatentability and establishes a reasonable likelihood that Petitioners will prevail in establishing that each Challenged Claim is unpatentable.

An electronic payment of \$41,500 for the requisite fees is being charged to deposit account no. 02-4550. 37 C.F.R. § 42.15(a). Any fee adjustments may be debited/credited to the deposit account.

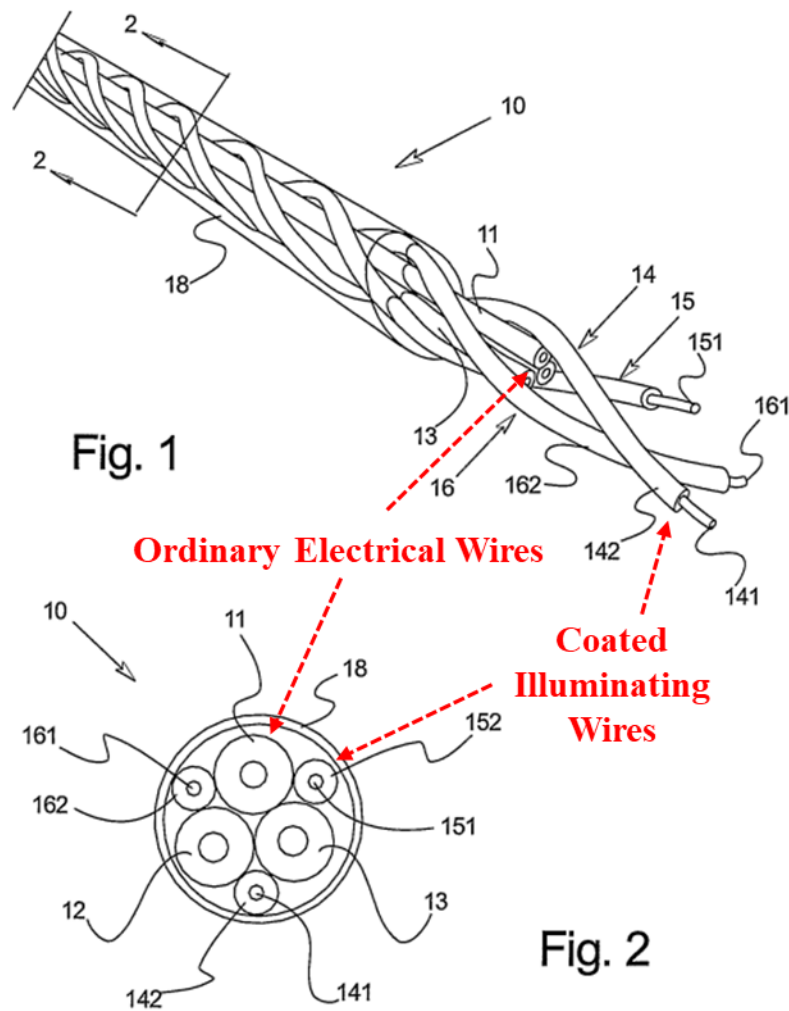
### **IV. THE ’829 PATENT**

The ’829 patent, titled “Visualisation Arrangement,” issued on July 29, 2014, from U.S. Patent Application No. 11/885,697, filed on October 3, 2007, which

claims priority to International Application No. PCT/SE2006/000283, filed March 6, 2006, which claims priority to Swedish Patent Application No. 0500523-6, filed March 7, 2005.

**A. The Specification**

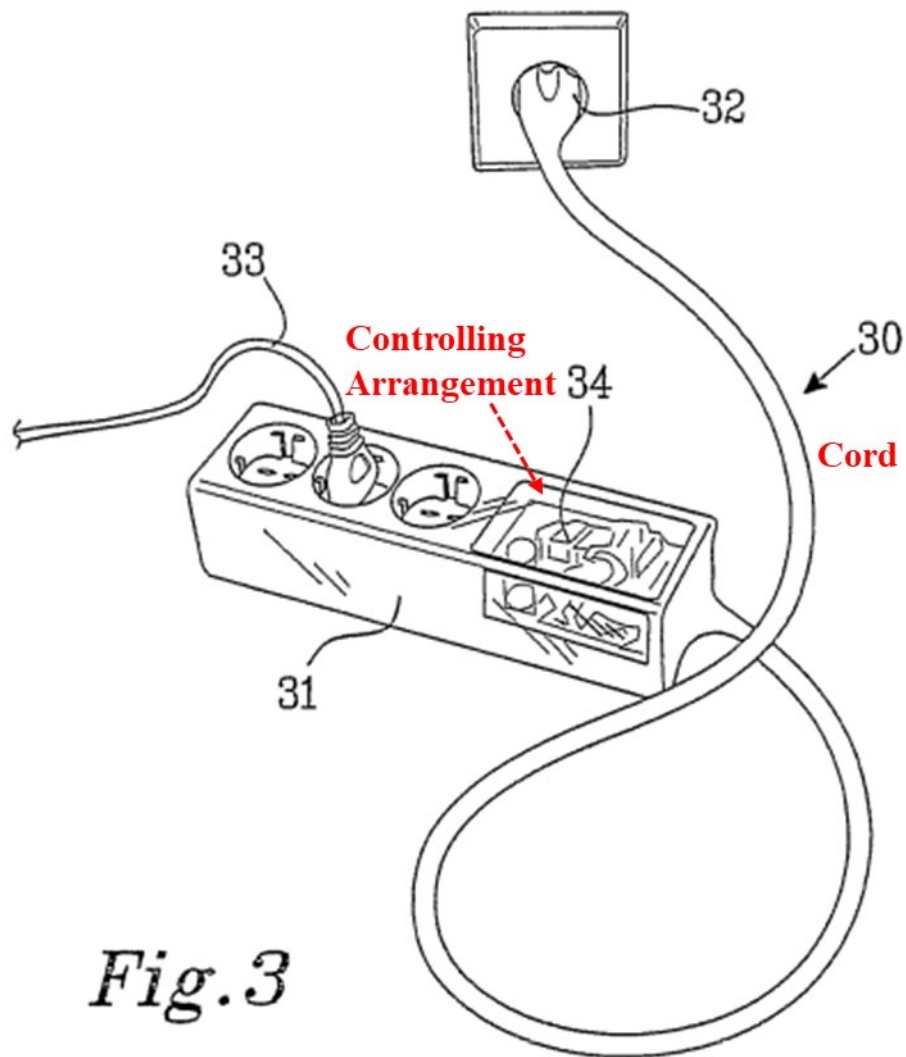
The '829 patent's disclosure is skeletal, with a Detailed Description under two columns. It describes a cord arrangement 10 with electrical wires for power, ground, and neutral 11-13 and three corresponding illuminating wires 14-16, each consisting of a conductor 141/151/161 with an illuminating coating 142/152/162. (EX1001, 2:64-3:7, Figs. 1, 2.)



EX1001, Figs. 1, 2 (annotated)<sup>1</sup>

The '829 patent's sole embodiment of a cord arrangement is "cord 30 of a [power] distributor 31," which has a "controlling arrangement" 34. (*Id.*, 3:23-32, Fig. 3.)

<sup>1</sup> Throughout, colored annotations have been added to reproduced figures.



EX1001, Fig. 3 (annotated)

The '829 patent's sole embodiment of a processing arrangement includes processing unit 42, which processes information from measuring arrangement 43 and controls current output from drivers 45a-45c with pulse width modulators (PWMs) 44a-44c. (*Id.*, 3:39-42, 3:53-61, Fig. 4.)

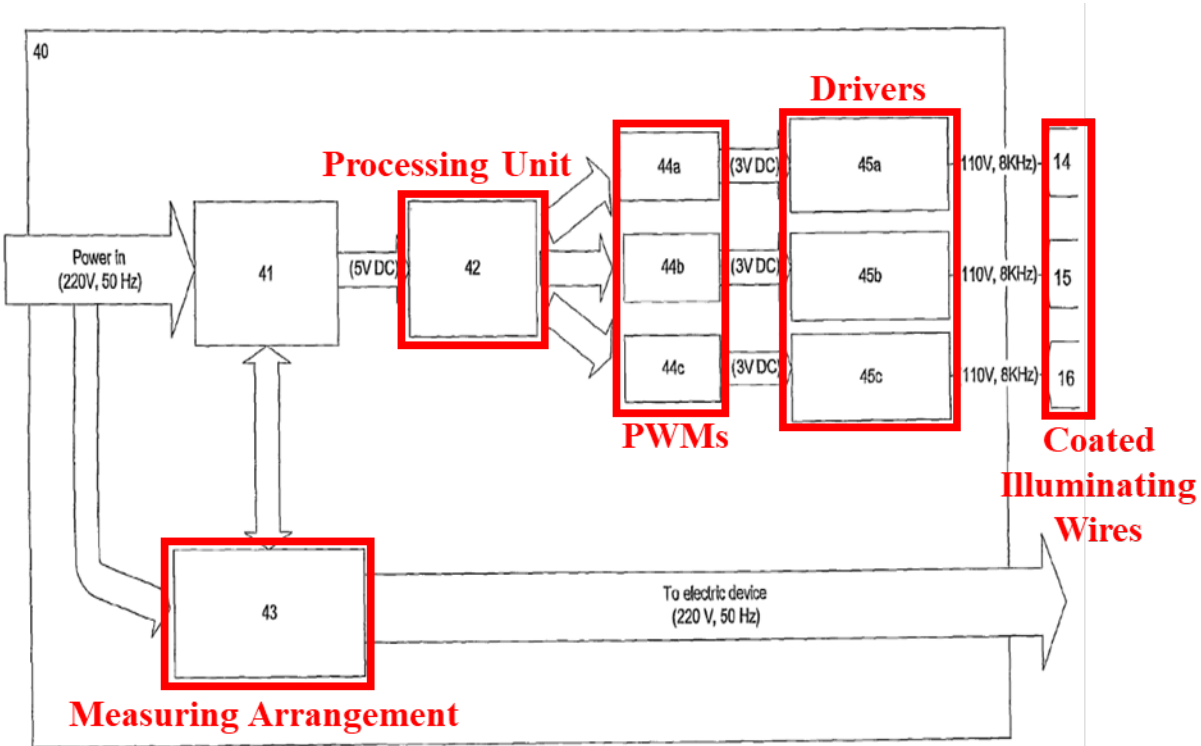


Fig. 4  
EX1001, Fig. 4 (annotated)

An illumination characteristic of phosphorus-coated illuminating wires is controlled by feeding current (or voltage, or frequency) output from the controlling arrangement “corresponding to the consumed current/voltage through the electrical wires.” (*Id.*, 3:65-14.)

## **B. The Claims**

Each of the four independent claims (1, 9, 14-15) relates generally to controlling the illumination of an illuminator, in order to indicate the level of a measured electrical quantity like power, current, or voltage in a conductor. None of the claims restricts the type of conductor or the level of current or voltage.

## **V. STATE OF THE ART AND LEVEL OF SKILL IN THE ART**

### **A. State Of The Art**

The '829 patent pertains to concepts and techniques that were well known by 2005, including: (1) measuring current in a cable, (2) visually indicating the measured level of current, and (3) linear illumination along the cable. (EX1003, ¶¶ 89-91.)

#### **1. Measuring Current In A Cable**

Measuring electrical current and voltage in a conductor was well known by 2005. (EX1003, ¶ 93; *see also* ¶¶ 94-101, 125.)

##### **a) '829's Implied Admissions About The State Of The Art**

The '829 patent says that its black-box “measuring arrangement” 43 (EX1001, Fig. 4) samples the current in an electrical cord’s electrical wires and provides the measured level of current to the processing unit 42, but it does not say *how* this is done (*id.*, 3:46-52; *see also* EX1003, ¶ 88), thereby implicitly admitting that skilled artisans already understood how. *In re Fox*, 471 F.2d 1405, 1407 (C.C.P.A. 1973) (claim elements not described in detail in the specification are presumed to be known to a skilled artisan).

##### **b) Multiple Current Sensors Were Well Known**

By 2005, magnetic current sensors and current-viewing resistors were well-known, established, and widely used to measure the flow of electrical current.

(EX1003, ¶¶ 94-101.) For example, “*Electrical Measurement, Signal Processing, and Displays*” (2004) (EX1024) describes several common current sensors, including current-to-voltage converting resistors, current transformers, and Hall effect sensors. (*Id.*, 2-1 through 2-10.) By 2004, these sensors were “commodity items available from a variety of manufacturers and distributors.” (*Id.*, 2-13 through 2-16 (listing 24 current sensor manufacturers and distributors, along with corresponding websites, addresses, emails, and phone numbers).) Skilled artisans were familiar with using at least current-viewing resistors, current transformers, and Hall effect sensors to measure current. (*See* EX1003, ¶¶ 94-95, 97-100.) These artisans also knew how to research other current sensors and how to implement these sensors. (*Id.*, ¶¶ 32, 90.)

**c) Borden And Godard Disclose Current Sensors**

Additionally, Godard details a current sensing circuit 31 with current sensor 32, identified as the commercially-available Allegro Micro Systems ACS750 current sensor. (EX1007, 4:39-64; *see also* EX1026; EX1003, ¶ 126.)

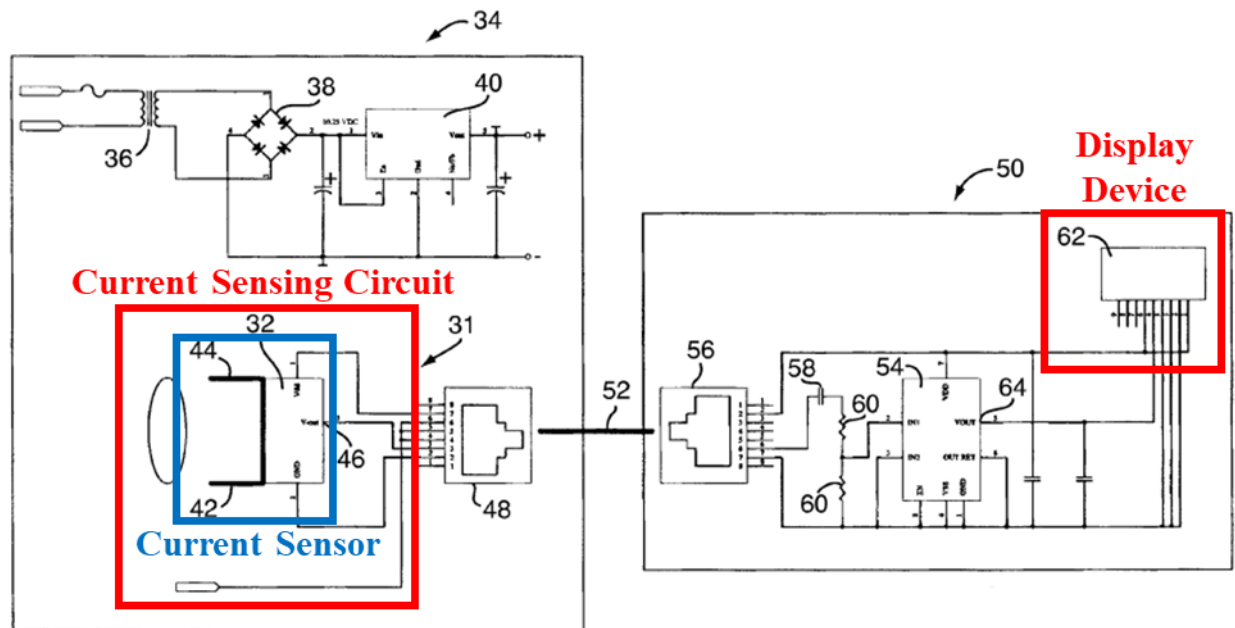


FIG. 3  
EX1007, Fig. 3 (annotated)

(EX1003, ¶ 212-213.) Also, Borden depicts current sensor circuits 44. (EX1009, [0024], [0029], Figs. 5, 9; *see also* EX1003, ¶ 130.)

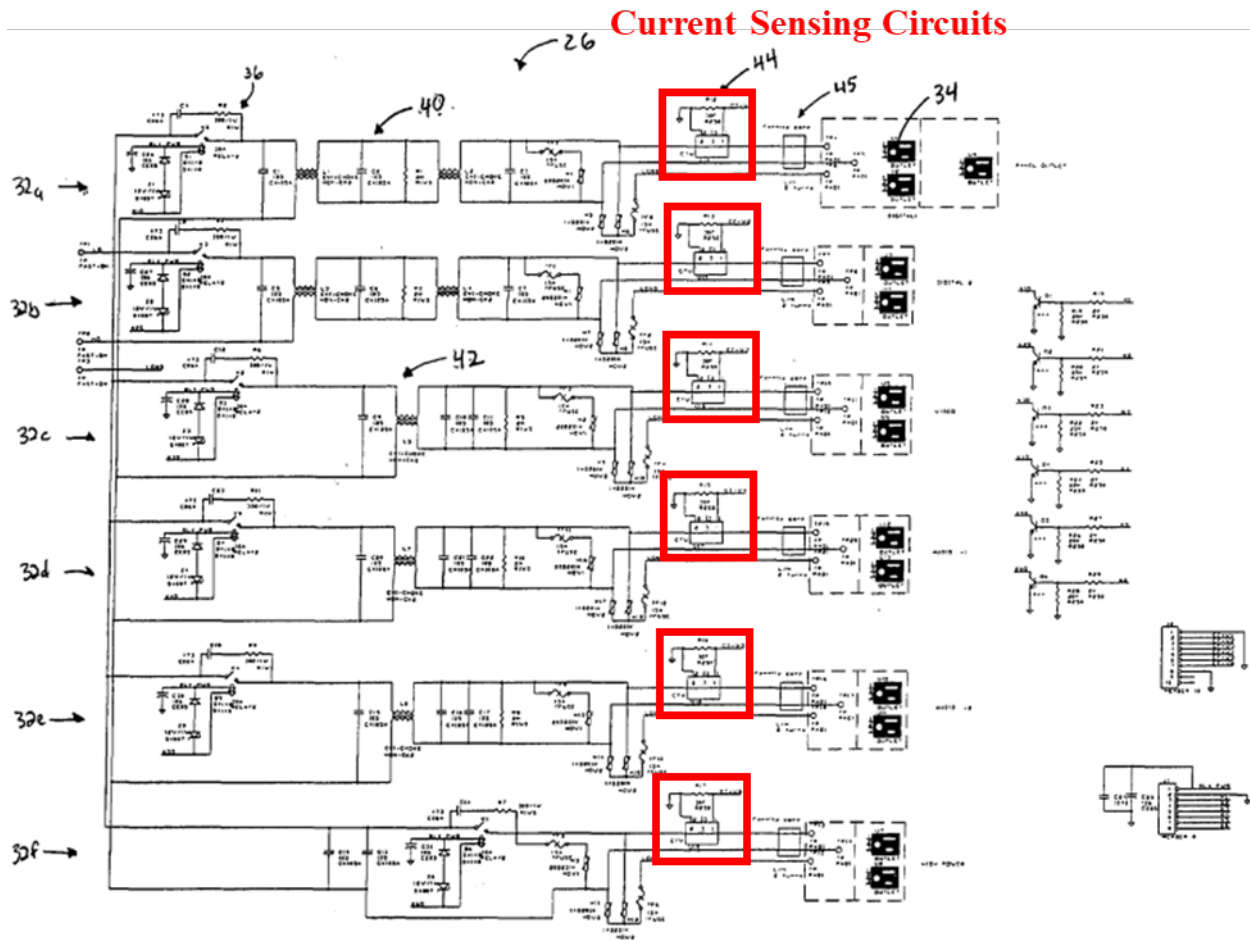


FIG. 9

EX1009, Fig. 9 (annotated)

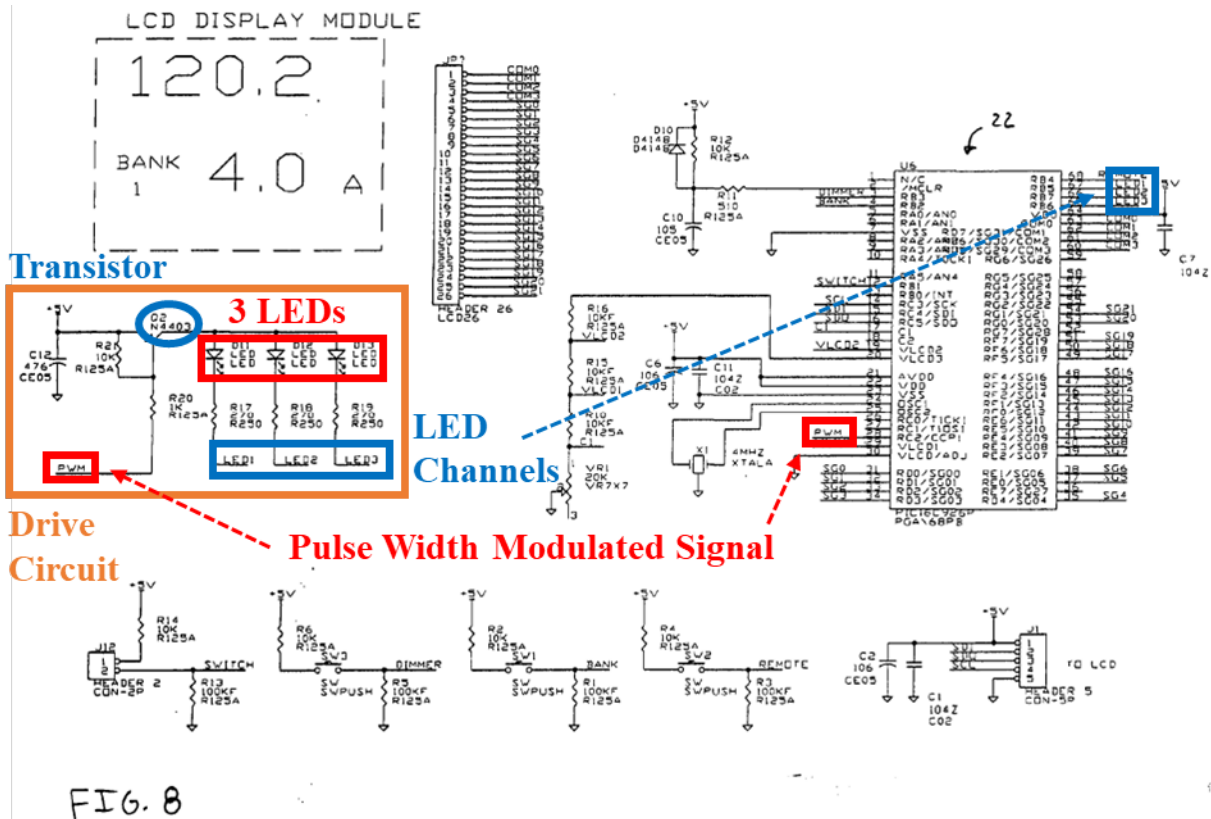
(EX1003, ¶ 266.) Skilled artisans were familiar with each of these types of current sensing circuits. (*Id.*, ¶¶ 97-101.)

## 2. Visually Indicating Level Of Current In A Cable

In addition to *measuring* current, prior art devices often *visually indicated* the level of current in the wire. (EX1003, ¶ 104.)

a) **Borden And Godard Disclose  
Visually Indicating The Level Of Current**

Godard discloses circuitry for visually displaying measured current in a voltmeter/display 62, including a particular model of commercially-available voltmeter. (EX1007, 4:65-5:20, Figs. 1-5.) Borden discloses circuitry for visually displaying in one or more LEDs the current measured in a wire. Specifically, signals proportional to current are provided to a user interface and display controller 22 (EX1009, Fig. 8) to provide a visual indication of current and voltage. (*Id.*, [0025].) The user interface and display controller 22 includes three LEDs in a transistor circuit driven by a pulse width modulated (“PWM”) signal (*id.*, Fig. 8). (EX1003, ¶¶ 130, 132.)



EX1009, Fig. 8 (annotated)

(EX1003, ¶¶ 137, 271.) Skilled artisans were familiar with each of these types of visual-display arrangements. (See *id.*, ¶¶ 102-104; see also ¶ 80.)

### 3. Linear Illumination Along a Cable, Including Modulated Illumination To Indicate Signal Level

Techniques for lighting the length of an electrical wire or cable also were well known to skilled artisans.

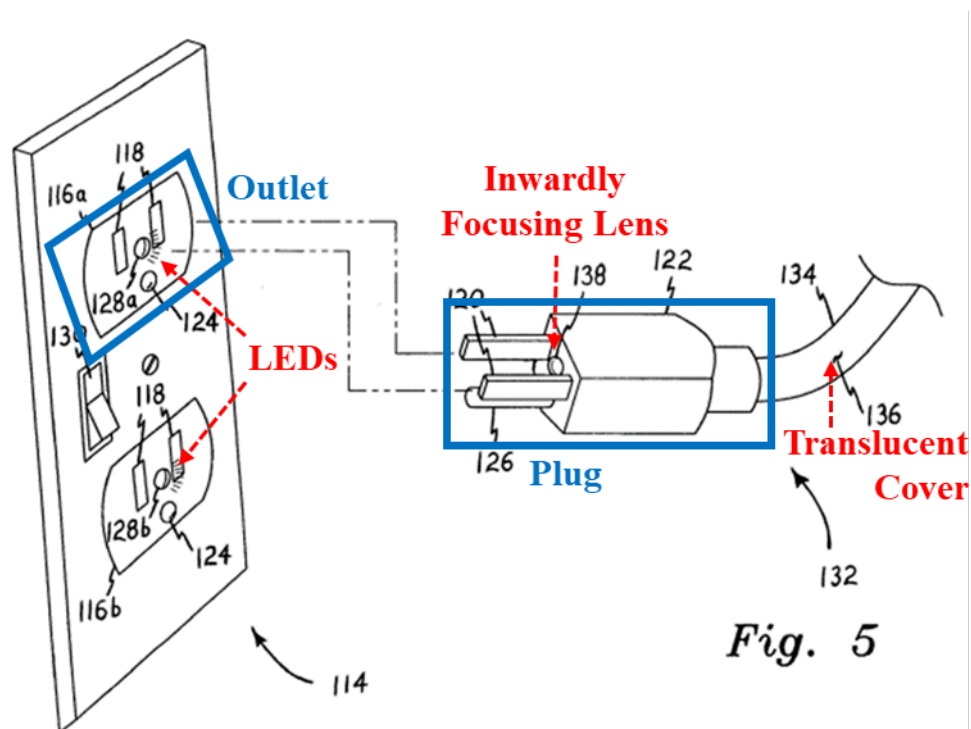
#### a) '829's Admissions About The State Of The Art

The '829 patent identifies several *prior art* disclosures of “illuminating wires” (EX1001, 3:8-13), “an optically observable cable” (*id.*, 1:23-39),

“electroluminescent devices” (*id.*, 1:40-57), and “an electric luminescence fiber” (*id.*, 1:58-67). (EX1003, ¶¶ 105, 108.)

**b) Currie Discloses Illuminating The Length Of A Cable**

Currie describes several ways to illuminate a power cable for safety or decorative reasons, including using one or more LEDs to illuminate a translucent outer cover. (EX1012, [0048], Figs. 1-8; EX1003, ¶¶ 122, 290-291.)



EX1012, Fig. 5 (annotated)

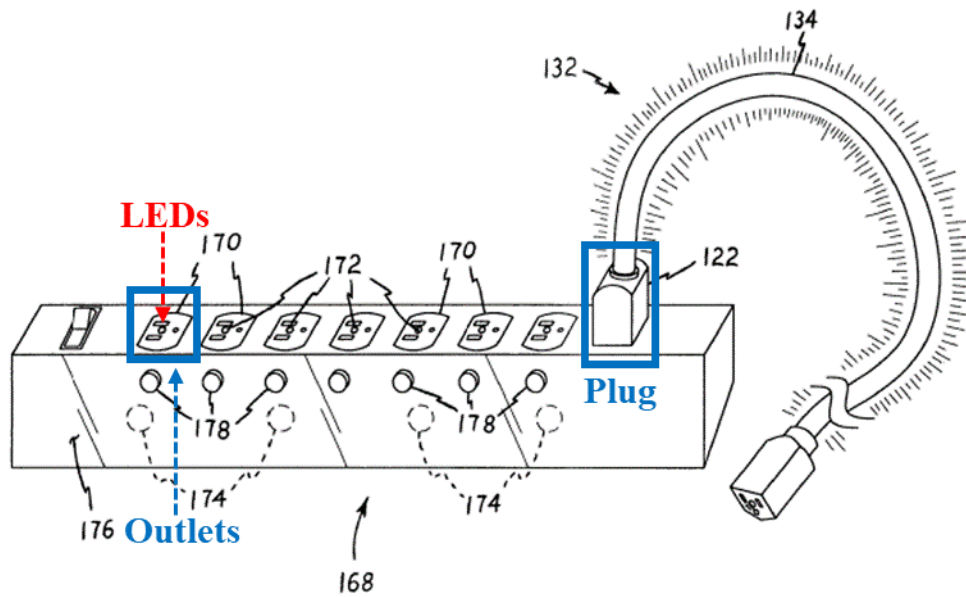


*Fig. 8*

EX1012, Fig. 8 (annotated)

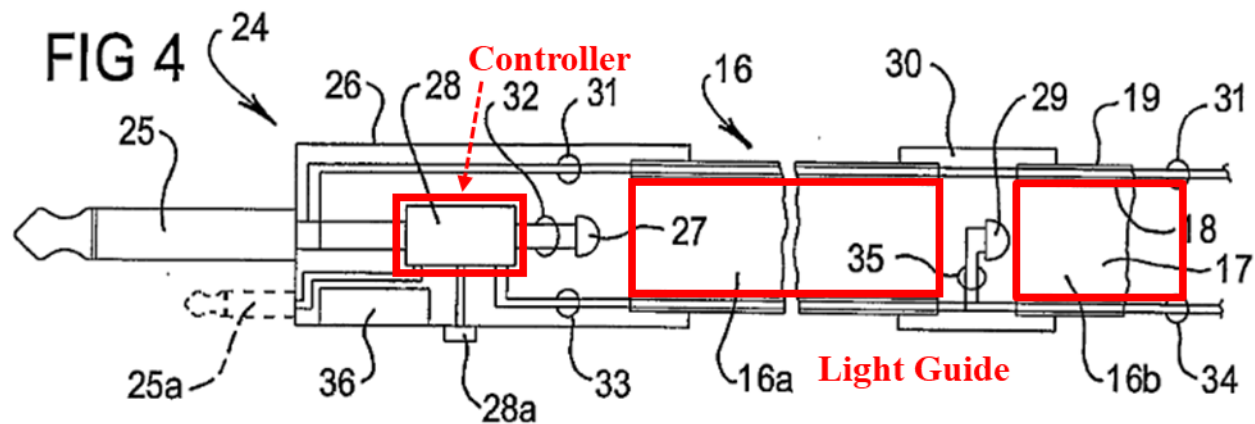
(EX1003, ¶¶ 292-293.) One way was to place LEDs 172 in each socket of a power strip and place an inwardly-focusing lens 138 in each power cord 134 (having translucent outer cover 136) to be plugged into the power strip. (EX1012, Figs. 5, 8.) Skilled artisans knew how to implement fiber optic couplers to propagate light from an LED onto an optical fiber light guide. (See EX1003, ¶¶ 85, 87, 109-112, 123; see also EX1018, at 942 (discussing transfer lenses).)

**c) Jablonski And Erickson Disclose  
Modulating Illumination Along The Length Of A  
Cable To Indicate The Level Of A Signal In The Cable**

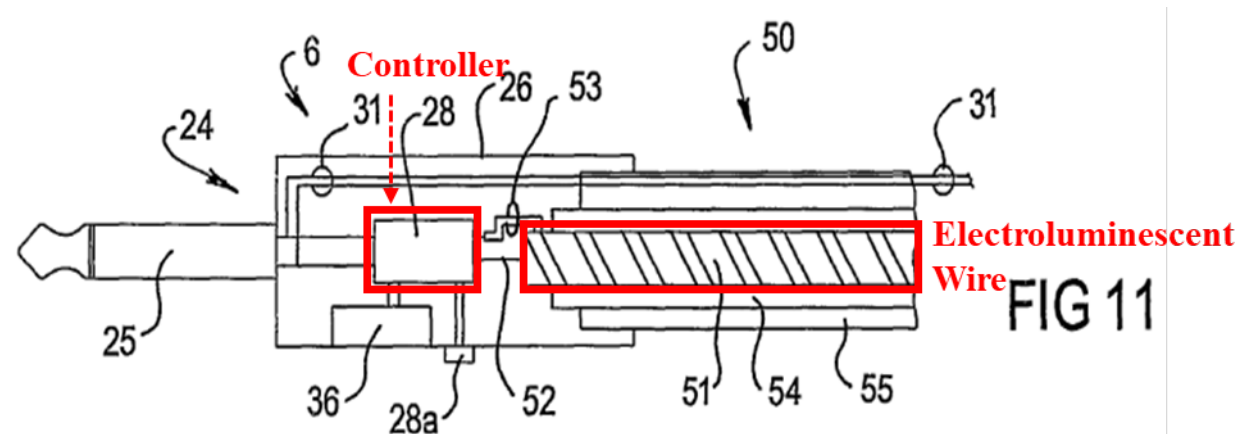
Erickson and Jablonski each disclose modulating the illumination of an electric cable to indicate the amount of some signal in the cable. In Erickson, LEDs illuminate a cable with translucent wire coverings according to transmitted data

signals by flashing at a rate that varies with the speed of data traffic. (EX1014, 1:3-38, 3:14-24, 3:38-48, 6:53-7:2.)

Jablonski discloses modulating the illumination of a light guide 16 (EX1005, 16:22-25, 21:24-27, Figs. 4, 7) or electroluminescent wire 50 (*id.*, 24:29-25:6, Fig. 11) with controller 28 according to the measured “signal currents” flowing through wires/conductors of a cable. (*Id.*, 1:26-33, 11:3-6, 13:14-16; *see also* EX1003, ¶¶ 115, 121.)



EX1005, Fig. 4 (annotated)



EX1005, Fig. 11 (annotated)

Skilled artisans knew how to make such arrangements. (*See* EX1003, ¶¶ 105-106, 108.)

**B. Person Of Ordinary Skill In The Art**

The person of ordinary skill in the art in 2005-2006 (“POSITA”) would have been familiar with the state of the art discussed above (section V.A, *supra*) and comfortable making such designs and altering them to serve varying design goals. (EX1003, ¶ 32.) For example, POSITAs knew how to acquire, design and/or build devices that measure current in a wire, communicate that measured current to a controller or processor, and output control signals from that controller or processor to modulate the illumination of a cable or cord according to the measured current and to indicate this level of current. (*Id.*, ¶¶ 89-90, 93-113.)

In March 2005, a POSITA would have had either (i) a Bachelor’s in electrical engineering or a related field and at least two years of experience designing power electronics or (ii) a Bachelor’s and Master’s in electrical engineering or a related field. Additional experience would have offset lesser education, and vice versa. (*Id.*, ¶ 31.) This is consistent with Dr. Woods’s experience working with skilled artisans. (*Id.*, ¶¶ 8, 33-35; *see also* EX1004.)

**VI. CLAIM CONSTRUCTION**

The claims and claim terms should be given the ordinary meaning they would have had to a POSITA on the earliest effective filing date, in view of the specification

and file history. 83 Fed. Reg. 51340; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-1313 (Fed. Cir. 2005) (*en banc*).

Unless otherwise expressly discussed, Petitioners apply the contextual plain and ordinary meaning of all claim terms below. Petitioners do not, however, waive any argument in any litigation that claim terms in the '829 patent are indefinite nor their right to raise additional issues of claim construction in any litigation.

**A. Proposed Constructions**

**1. “Current”**

The term “current” appears in claims 1, 9, 13, and 14 in conjunction with the terms “power” and “voltage” (*e.g.*, “power, current or voltage”). The claims often describe “current” along with “power” and “voltage” as an “electrical quantity.” For example, claims 1, 9, and 14 all include the phrase “an electrical quantity, being one or several of power, current or voltage.” (EX1001, [4:39-40], [5:5-6], [5:26-27].) As used in claims 1, 9, 13, and 14, the term “current” should have its plain and ordinary meaning without restriction to any particular form (*e.g.*, direct or alternating), magnitude, or purpose.

Extrinsic evidence demonstrates that a POSITA would have understood “current” as movement or flow of electrons. (*See, e.g.*, EX1016, *Modern Dictionary of Electronics* at 165 (defining “current” as “the movement of electrons through a conductor”); EX1018, *Fiber Optics Illustrated Dictionary* at 224 (defining “current”

as “[m]ovement of electrons through a conducting medium, [...] Electricity moving through a wire or cable is current”); EX1003, ¶¶ 36-38.) This is consistent with the plain and ordinary usage of current to include various forms (*e.g.*, alternating, direct), levels (*e.g.*, high voltage, high power, low voltage, low power, *etc.*), and implementations (*e.g.*, supplying power, audio and data signals, or a mixture of both). (*Id.*, ¶¶ 52-62; *see also* ¶ 49.) For example, *Wire, Cable, and Fiber Optics for Video & Audio Engineers* provides the example of a light bulb flashing in Morse code. (EX1021, 4-5.) In this example, the same current is both electrical energy that the bulb converts to light and the Morse code signal. (*Id.*, 2, 4-5; EX1003, ¶ 58; *see also* ¶¶ 56-57.)

Consequently, the term “current” should be given its plain and ordinary meaning. But if the Board concludes that “current” should be construed, it should be construed to encompass any magnitude of alternating or direct current, including current carrying an audio or data signal.

**2. “Means for illumination when  
energized to indicate an electrical quantity”**

Claim 9 recites “means for illumination when energized to indicate an electrical quantity, being one or several of power, current or voltage through the at least one electric wire.” (EX1001, [5:4-7].) This “means for” language unaccompanied by any structure for performing the recited function requires

interpretation under 35 U.S.C. § 112, ¶ 6. The claim language states the function of this “means” element. The corresponding structure disclosed in the specification is an electroluminescent wire or optical fiber, and circuitry for energizing the same. (*Id.*, [2:27-31], [2:33-37], [3:56-4:14].)

The '829 specification's structure for energizing electroluminescent wire is inverter module drivers 45a-45c, which feed “current, voltage and frequency corresponding to the consumed current/voltage through the electrical wires” (*e.g.*, 0-100 volts alternating current at 8 KHz) causing phosphorus coating of the electroluminescent wires to glow like neon. (*Id.*, [3:53-61], [3:65-4:10].)

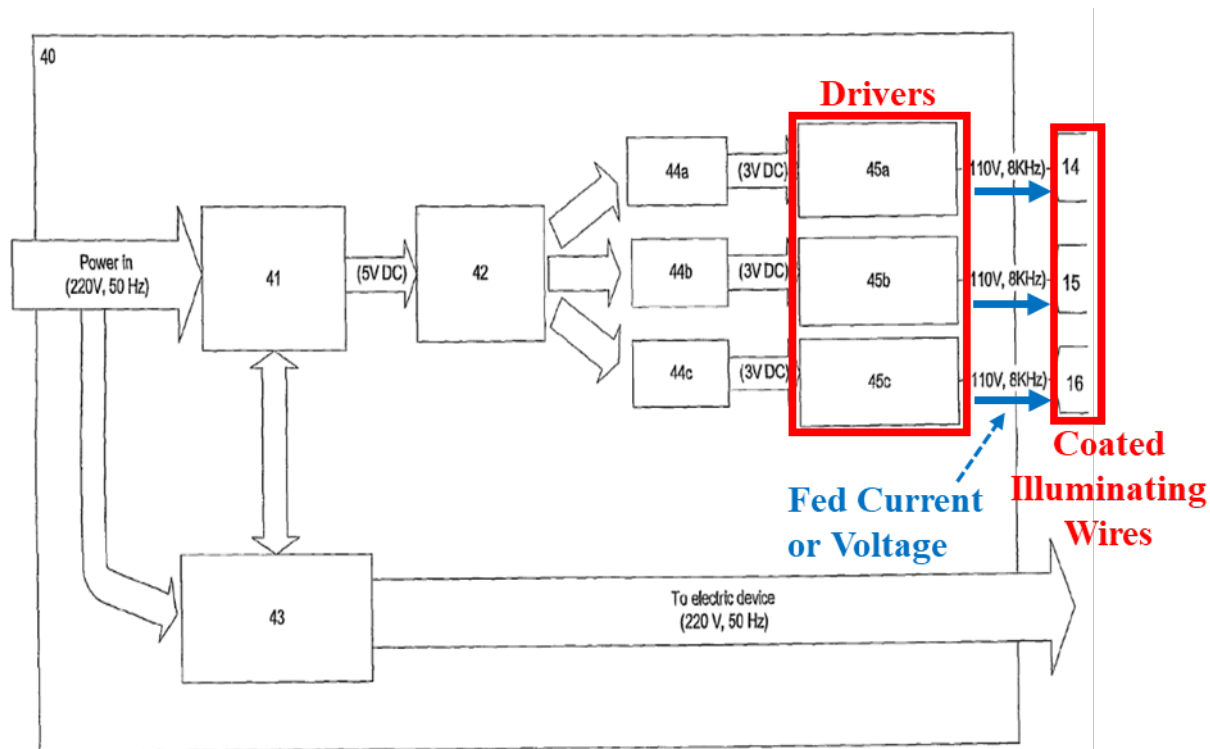


Fig. 4  
EX1001, Fig. 4 (annotated)

Fig. 4 of the '829 patent provides structure for energizing electroluminescent wires by illustrating inverter module drivers 45a-45c (*id.*, [3:56-61]) feeding varying current, voltage, and/or frequency (*id.*, [3:65-4:2]) of 0-110 volts of alternating current (*id.*, [3:56-58], [4:7-8]) to electroluminescent wires 14, 15, and 16 (*id.*, [3:4-7], *see also* [3:8-13] (providing various examples of electroluminescent wires)), illuminated by a phosphorus coating that glows like neon. (*Id.*, [3:4-6], [4:3-10].)

As structure for the optical-fiber embodiments, the '829 specification discloses: “In case of optical fibers, the drivers may be connected to intensity and/or pulse controlled light sources, such as light emitting diodes (LED) connected to one end of the fibers.” (*Id.*, [3:62-64].)

**VII. GROUNDS 1 AND 2: CLAIMS 1-17 ARE ANTICIPATED  
BY JABLONSKI OR, IN THE ALTERNATIVE,  
OBVIOUS OVER JABLONSKI IN VIEW OF GODARD**

**A. Jablonski**

Jablonski (EX1005) is prior art under at least 35 U.S.C. § 102(e) (pre-AIA) as its U.S.-designating PCT patent application (EX1006) was filed November 26, 2004, about 15 months before the PCT application date of the '829 patent.

Jablonski discloses each element in the Challenged Claims as properly construed. To the extent Patent Owner argues for an unduly narrow construction of “current” as excluding currents associated with a signal (*e.g.*, audio and data signals)

(*see supra* Section VI.A.1), the Challenged Claims are obvious over the Jablonski-Godard combination.

Jablonski discloses:

a signal line, the line including a side-emissive light guide extending along at least a part of said line, a light source for illuminating the light guide, and a controller for controlling the light source based upon a signal on the line, e.g. based upon a **signal current flowing therein**. The signal line may include suitable electrical conductors/wires along its length for transmitting **electrical signal current** from one end of the line to the other.

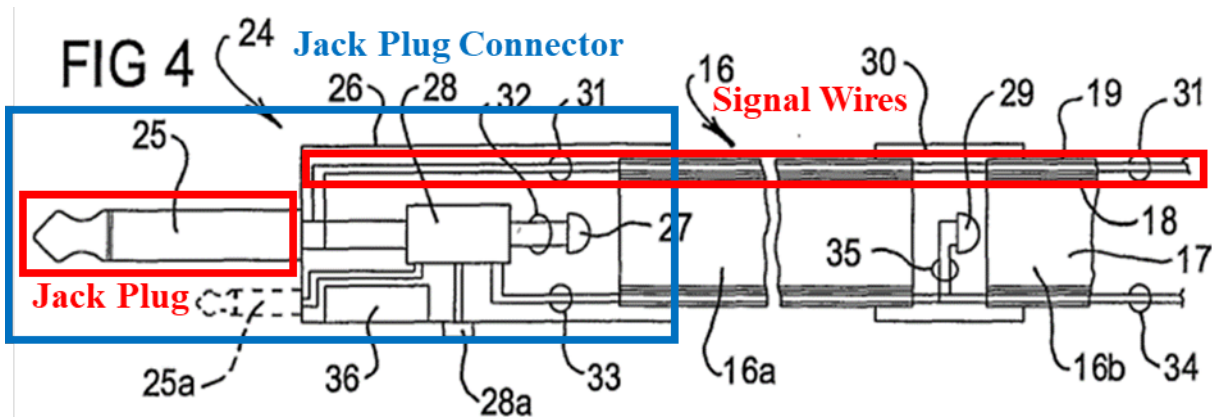
(EX1005, 1:26-33 (emphasis added); *see also id.*, 9:8-12, 9:24-27, 11:3-8, 11:32-12:2, 13:14-16, 17:20-23, 18:8-13, 21:31-34, 24:11-16.)

A “signal current” is a “current” (*i.e.*, a flow of electrons through an electrical conductor) conveys information. But distinguishing signal current from other forms of current is immaterial because electrical power is absorbed or delivered whenever current flows and signals dissipate electrical energy (*i.e.*, power). (EX1003, ¶¶ 52-57.)

Jablonski explains that “the term ‘signal line’ should be interpreted broadly” (EX1005, 2:16-19; *see also id.*, 13:11-13), and includes electrical lines (*id.*, 2:19-20, 13:9-11, 24:21-23), a pair of electrical wires (*id.*, 4:29-30), and cables (*id.*, 5:10-14,

13:11-13) with suitable connectors for the input or output of an associated device, including jack plugs (*id.*, 4:26-28).

Jablonski discloses signal lines that also provide power. (EX1005, 4:23-25, 17:34-18:2; EX1003, ¶¶ 118, 120.) For example, as illustrated in Fig. 4, Jablonski discloses an illuminated cable with jack plug connection 24 and jack plug 25. (EX1005, 16:22, 16:26-28.)



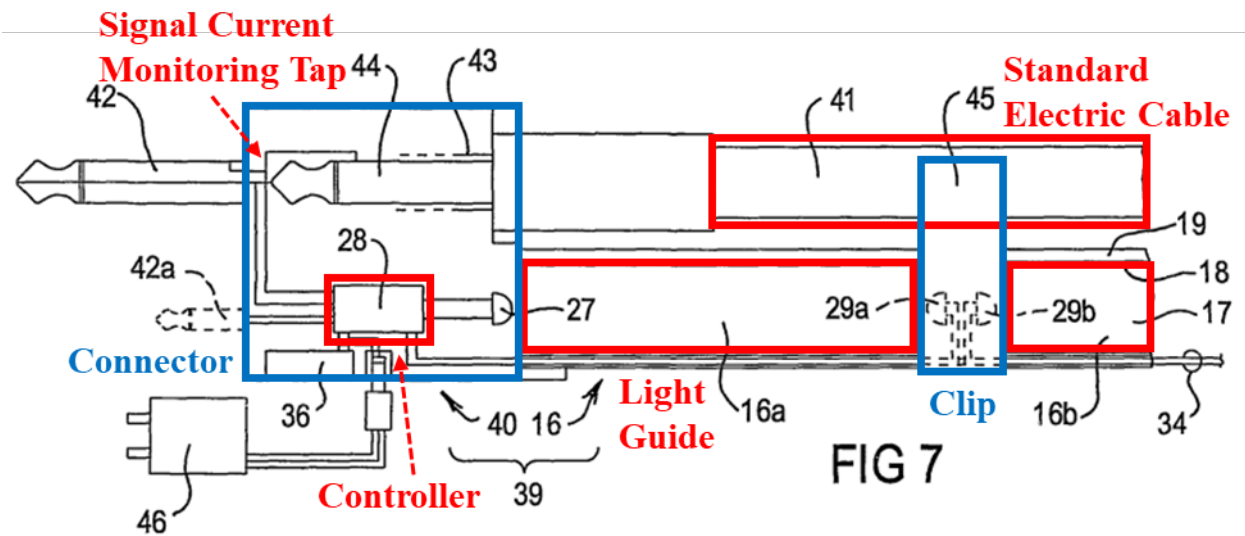
EX1005, Fig. 4 (annotated)

(EX1003, ¶ 151.) A POSITA would understand that audio cables with jack plugs can carry sufficient current to power transformers and LEDs. (*See e.g.*, EX1003, ¶¶ 52, 56-57, 71, 124; EX1012, [0057]-[0058].) A POSITA would further recognize that audio cables may power remote devices, *e.g.*, a microphone. (EX1003, ¶¶ 84, 116-119.) For example, various Jablonski embodiments provide that “phantom power” may power its microprocessor controller and the light source(s) (*e.g.*, LEDs) of its light guide assembly. (EX1005, [4:23-25], [17:34-18:2].)

Jablonski discloses several variations of “linear lighting elements” (*id.*, 10:34-11:8) to illuminate the signal line, including one or more optical “light guides” illuminated by one or more LEDs (*id.*, 5:26-6:4, 7:9-12, 7:18-29, 8:12-19, 16:22-25, 19:24-20:14, 22:27-24:10, Figs. 4-10), and electroluminescent wires or tape (*id.*, 11:9-19, 11:25-31, 13:1-3; 24:29-26:2, Fig. 11.) (*See also* Section V.A.3.c, *supra.*) The optical light guides and electroluminescent wires are interchangeable in all embodiments. (*Id.*, 10:32-11:28, 12:3-5, 26:1-2.)

The Jablonski controller is preferably a programmable microprocessor. (*Id.*, 6:5-12.) It modulates illumination characteristics, like intensity, frequency, and color based on the measured characteristics of signal currents in the signal line. (*Id.*, 2:21-28, 3:15-18, 6:5-7, 14:15-20.) The controller determines “signal current flowing” in the signal line in various ways (*id.*, 1:28-30, 11:4-6), including by tapping into the signal wires or through a “capacitive, magnetic or inductive sensor.” (*Id.*, 14:3-7; *see also id.*, 3:21-24, 15:8-11, 24:17-20.)

Jablonski discloses a “light guide attachment” that is attached or mounted to an existing signal cable with a “coupling adapter” or “connector.” (*Id.*, 5:10-21, 9:6-21.)



EX1005, Fig. 7 (annotated)

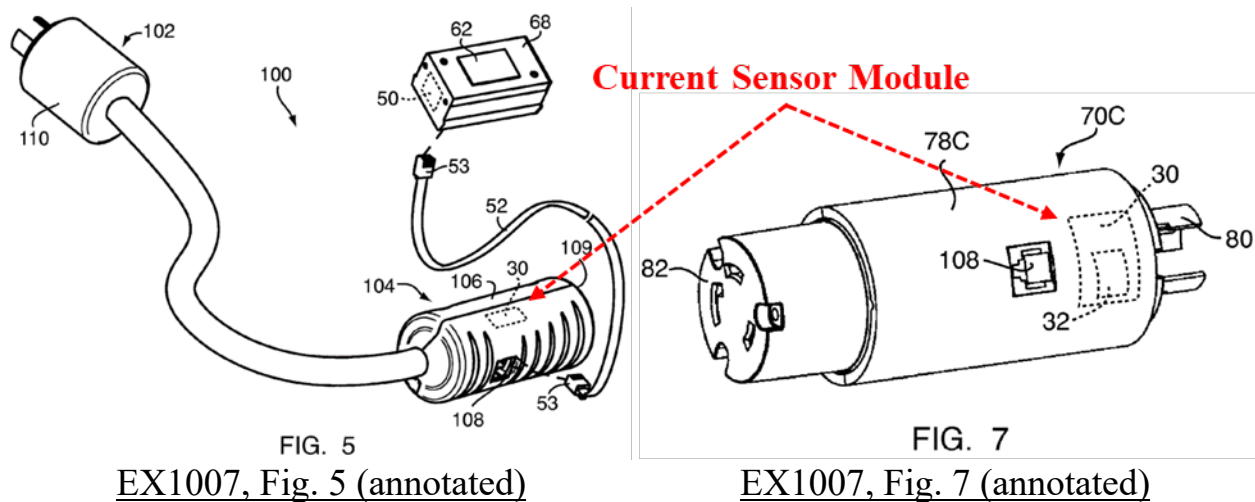
Jablonski Fig. 7 illustrates this light guide-attachment constructed from standard electric cable 41 and attachment 39, which includes light guide(s) 16 and connector 40. (EX1005, 21:24-27; EX1003, ¶ 155.) Light guide(s) 16 is connected to cable 41 along its length by one or more clips 45 that snap-fit over the cable. (EX1005, 22:1-2.) Connector 40 is illustrated with jack plug 42 and jack socket 43, with the plug 44 of cable 41 plugged in. (*Id.*, 21:28-31.) Microprocessor controller 28 monitors signals in the wires between jack plug 42 and jack plug 44 and controls LED 27 according to monitored signals. (*Id.*, 17:20-24; *see also id.*, 3:21-24, 14:3-7, 15:8-11, 24:17-20; EX1003, ¶¶ 113, 121.)

### B. Godard

Godard (EX1007) is prior art under at least 35 U.S.C. § 102(e) (pre-AIA) as its U.S. patent application (EX1008) was filed October 7, 2004, about 17 months

before the PCT application date of the '829 patent. Godard's application (EX1008) discloses those aspects of the issued Godard patent relied on herein.

Godard discloses a current sensor detecting electrical current flow through a power cord (EX1007, Fig. 5) or power cord adaptor (*id.*, Fig. 7). (*Id.*, 2:58-64, 3:6-16.) The current sensor provides an output signal that varies in proportion to detected current flow and is coupled to a processing circuit and display for displaying characteristics of this current flow. (*Id.*, 2:61-3:1; 3:13-19.)



Godard Figs. 5 and 7 illustrate current sensor module 30 with current sensor 32 mounted inside of a power cord adaptor 70C or power cord 100 to detect current flow. (*Id.*, 6:11-24; 6:29-45; EX1003, ¶ 211.)

Godard Fig. 3 is a circuit diagram that illustrates a current sensing circuit 31 with current sensor 32. (EX1007, 5:12-17.)

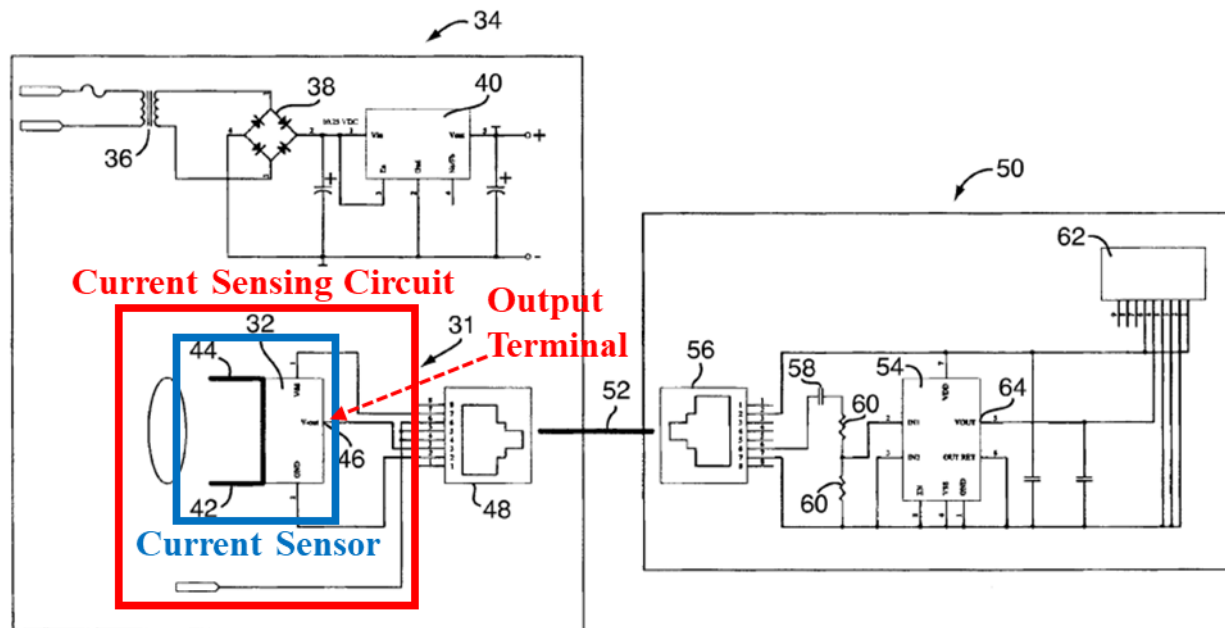


FIG. 3  
EX1007, Fig. 3 (annotated)

(EX1003, ¶ 212.) Current sensor 32 detects current flow through a power supply cord and provides a proportional output voltage at output terminal 46. (EX1007, 4:39-46.) One example of a suitable current sensor is the Allegro Micro Systems AC750 Hall effect sensor. (*Id.*, 4:50-64; *see also* EX1026.)

### C. Combination Of Jablonski And Godard

Obviousness Ground 2 is an alternative to Anticipation Ground 1.

The Jablonski-Godard combination modifies the Jablonski embodiments (EX1005, Figs. 4-5, 7, 11) with the types of current sensor taught by Godard (EX1007, Figs. 3, 5, 7) to detect the current drawn through a power cable supplying electrical energy (*id.*, 1:57-62, 3:13-19, 5:8-12) and displays the level of this current with Jablonski's linear lighting element. (*See* EX1003, ¶ 214.)

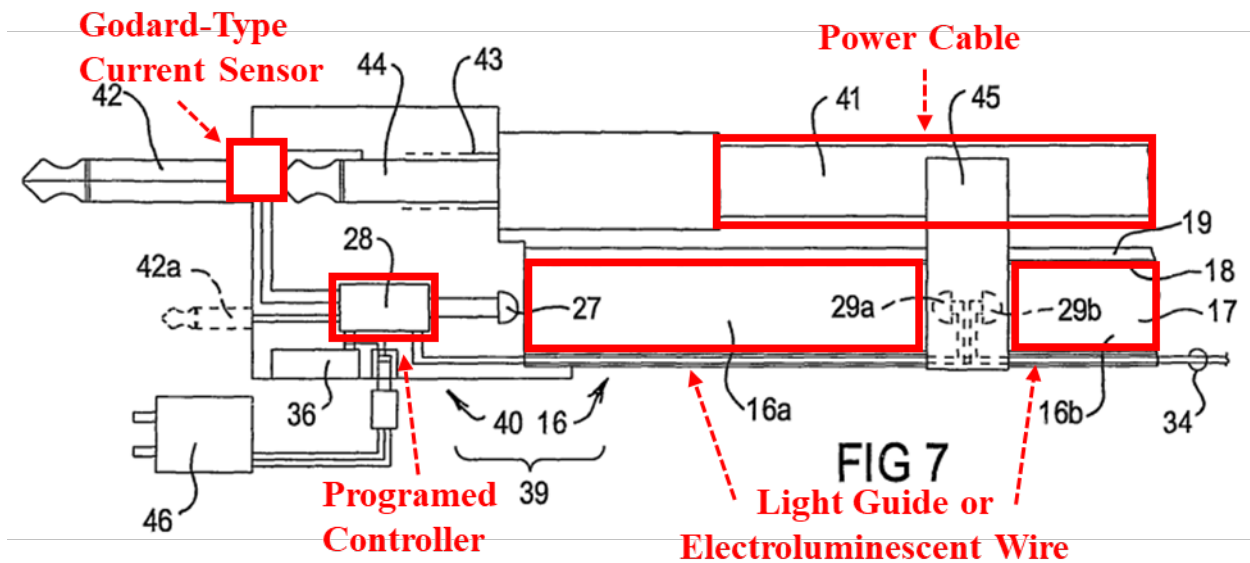
The combination's power cables may be any type of power cable, including those disclosed in Jablonski. Jablonski discloses embodiments of a music player (*e.g.*, hi-fi system, karaoke machine, *etc.*) with illuminated cables connected to a microphone, loudspeaker, or headphones (EX1005, 13:4-8), an amplifier connected to an instrument (*e.g.*, electric guitar) (*id.*, 15:12-15), and a games console or computing device connected to a controller, keyboard, computer monitor, television, or other display (*id.*, 15:28-31). In these embodiments, both peripheral devices (*e.g.*, loudspeaker, keyboard, *etc.*) and the music player, amplifier, or game console itself receive electrical power through a power cable. (EX1003, ¶¶ 116-119.) Jablonski provides for illumination of ordinary electrical cables. (EX1005, 5:1-4, 17:10-13, 21:24-27.) The combination's power cables may also be those disclosed in Godard. Godard teaches "detecting electrical current flow through the power supply cord" (EX1007, 1:57-60) and displaying the level of current through this cord. (*Id.*, 2:64-3:1, 3:16-19; *see also id.*, 2:5-10 (displaying the "electrical load" of connected devices); EX1003, ¶¶ 215-216.)

The combination's current sensor may be any type of current sensor taught by Godard. Godard discloses detecting the power cord's current with a current sensor (EX1007, 2:58-64, 3:13-16), which provides an output signal at least partially "proportional to the detected current flow." (*Id.*, 4:61-64.) Godard identifies a magnetic Hall effect sensor as an example of a suitable sensor. (*Id.*, 4:42-46;

EX1003, 217.) Jablonski anticipates because it already discloses monitoring signal current with “a capacitive, magnetic or inductive sensor located adjacent” to signal wires. (EX1005, 14:3-7.) But, in the event the claims are construed to exclude such signal currents, the Ground 2 combination uses a current sensor taught by Godard to measure current in wires that carry current for the purpose of supplying electrical energy.

In the combination, the Jablonski microprocessor controller is programmed or, as necessary, reprogrammed (EX1005, 3:18-20, 6:7-12) to modulate Jablonski’s linear lighting element according to the output signal of Godard’s current sensor. (EX1003, ¶¶ 92, 113; *see also* ¶ 131.) For example, Jablonski’s light guide attachment (Fig. 7) is combined with Godard’s current sensor to detect and display the current in a power cable used to power devices (*e.g.*, games console, music player, loudspeaker, keyboard, *etc.*). (*See* EX1003, ¶ 219.)

The combination employs Godard’s current sensor to detect current through an illuminated power cable or a power cable with light guide attachment.



Light Guide Attachment Embodiment of Jablonski-Godard Combination

In one embodiment of the combination, Jablonski's light guide attachment is mounted to an electric cable with connector 40 and clips 45, as illustrated above (EX1005, 21:24-22:6), Godard's current sensor is placed adjacent to the wires between plug 42 and socket 43 as disclosed in Jablonski (*id.*, 14:3-7, 21:28-31) to detect current drawn through a power cable as disclosed in Godard (EX1007, 1:57-60), and a proportional output signal is provided to Jablonski's programmed controller as disclosed in Godard (*id.*, 4:61-64), such that Jablonski's controller modulates the light guide as disclosed in Jablonski. (EX1005, 21:31-34; *see also* EX1003, ¶¶ 220-221.)

**D. Motivation To Combine Jablonski  
And Godard And Expectation Of Success**

POSITAs were motivated to make this Jablonski-Godard combination, at least because it maintains Jablonski's advantages of indicating current along a cable and applies them to indicate current along a power cable to solve the issues addressed in Godard. Godard addresses the issue of monitoring current or power usage when power cords are plugged into an obscured location like the inside of a cabinet, behind an appliance, or below a machine. (EX1007, 1:25-40.) Godard addresses this issue by providing a remote ammeter display. (*Id.*, 2:64-3:5, 3:29-31.) Jablonski displays varying light (*i.e.*, modulates illumination) for the similar purpose of visually indicating dynamic electrical signals that normally are hidden inside a cable. (EX1005, 1:16-17, 2:25-33, 3:15-18, 6:1-4, 13:14-16, 16:13-18, 18:11-13, 19:1-4.) Thus, POSITAs would have been motivated to solve Godard's issue of displaying current through a power cable plugged into an obscured location by illuminating the cable itself with a lighting element that modulates illumination to display the same electrical current. This would provide the advantages of: (1) making a visual indication of power cord status more visible (*i.e.*, more noticeable to the person being informed), especially in low-light environments; (2) making the power cord or cable itself more visible for safety reasons; and (3) providing a modulating light for decorative reasons. All three were known goals in the art. (*See* EX1003, ¶¶ 105, 115,

222-224.) Indeed, Jablonski and Godard are an especially natural combination because Jablonski's linear lighting element is illuminated for an *informative purpose*: Jablonski modulates illumination according to measured "signal currents" through a signal cable, thereby indicating the transmission of data, audio, *etc.* through the cable. (EX1005, 1:26-33, 11:3-6, 13:14-16.) Godard also serves an *informative purpose* by providing a remote ammeter for displaying the current of a power supply cord. (EX1007, 1:66-2:2, 2:54-3:1, 3:16-19, 6:45-53; *see also* EX1003, ¶ 225.)

In view of the state-of-the-art (*see* Section V.A, *supra*), POSITAs motivated to display current supplied through a power cable for informative, safety, and/or decorative reasons would have combined Jablonski and Godard with a high expectation of success. The only necessary modification was to measure current supplying electrical energy through a power cable with an appropriate sensor as disclosed in Godard (EX1007, 1:57-62, 3:13-19, 4:39-46, 5:8-12). (EX1003, ¶¶ 97-98, 126.) The Jablonski microprocessor controller already monitors this output and generates control signals to modulate the linear lighting element(s) accordingly (EX1005, 13:17-20, 14:3-7) and would have been programmed or reprogrammed (*id.*, 5:24-25, 6:5-12) as necessary to display current associated with a power cable (EX1007, 1:66-2:2, 3:16-19, 3:25-28, 6:45-49). (*See* EX1003, ¶¶ 121, 219, 226.)

**E. Detailed Mapping Of Jablonski And Godard To Claims**

**1. Claim 1**

[1.a]<sup>2</sup> *An arrangement for visual indication of an electrical quantity, being one or several of power, current or voltage through a conductor,*

Ground 1: Jablonski discloses this limitation.<sup>3</sup> (See EX1003, ¶¶ 156-157.)

Jablonski provides a visual indication (through its modulated lighting element) of an electrical quantity (*e.g.*, detected signal currents through a conductor). Specifically, Jablonski modulates a light source that illuminates a “linear lighting element” to indicate the state of detected signal currents through wires/conductors in a signal line. (EX1005, 1:26-30, 9:7-33, 10:32-11:6.) Jablonski determines the state of “signal current flowing” through the signal line’s conductor wires (*id.*, 1:29-31, 19:1-4), including by detecting signal current with a “capacitive, magnetic or inductive sensor.” (*Id.*, 14:3-7; *see also id.*, 3:21-24, 15:8-11, 24:17-20.) Jablonski then modulates the intensity, frequency, color, or other characteristics of a light source illuminating the linear lighting element according to this detected signal

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<sup>2</sup> Some claim limitations are numbered for clarity.

<sup>3</sup> Petitioners use the terms “limitation” and “element” loosely without taking positions on whether the claim language is entitled to patentable weight or is merely part of the claim’s environment.

current, to provide a visual indication of this current. (*Id.*, 2:21-28, 3:15-18, 11:13-19, 14:15-20, 18:8-13, 25:17-21.) This results in a visual indication of current through a conductor. (EX1003, ¶¶ 115, 122; *see also* EX1005, 16:15-18 (“[I]llumination could provide practical information, *e.g.* a confirmation that information is flowing, and the illumination could vary depending on the speed of data transfer, type of data, its direction.”).)

In some embodiments, Jablonski’s signal line doubles as a power line, providing power to external equipment like an audio microphone, and/or to the signal line’s own controller and LEDs. (EX1005, 4:23-25 (“phantom power”), 17:34-18:2 (“same”).) Phantom power and audio signals are simultaneously transmitted over the same cable to connected audio devices. (EX1003, ¶¶ 84, 118.) Thus, the currents measured and indicated by Jablonski include currents powering a device. (*See* EX1003, ¶ 71, 119.)

Ground 2: The combination applies Jablonski’s techniques and designs to illuminate a power cord or cable according to its transmission of current associated with supplying electrical energy. Godard discloses measuring current through a power cord and displaying characteristics of this current. (EX1007, 1:66-2:2, 2:61-3:1, 3:13-19, 4:39-42, 5:12-17, 6:45-49.) Jablonski is modified, as needed, with an appropriate capacitive, magnetic or inductive current sensor (*e.g.*, *id.*, 4:39-46, 50-64) to measure current through a power cable, and to control illumination of

Jablonski's linear lighting element according to that measured current. (*See* EX1003, ¶¶ 227-228.)

[1.b] *wherein the arrangement comprises a substantially wire shaped illuminator, and*

Grounds 1 and 2: Jablonski discloses this limitation. (*See* EX1003, ¶¶ 158-159, 229.) Jablonski discloses light guides, electroluminescent wires, and other light elements that are substantially wire shaped because they are linear, elongated, and/or cylindrical (EX1005, 10:32-11:8, 19:33-34, 22:27-23:10, 24:29-31, Figs. 1-3, 8-10) and because they extend along the length of a cable or electric wire(s). (*Id.*, 1:26-33, 5:14-16, 5:22-23, 8:5-19, 9:6-12, 9:22-33, 11:3-8, 11:25-31, 13:17-19.)

[1.c] *a controller for control (sic) at least one illumination characteristic of said wire shaped illuminator with respect to said electrical quantity by measuring the electrical quantity, and*

Ground 1: Jablonski discloses this limitation. (*See* EX1003, ¶¶ 160-161.)

Jablonski discloses a microprocessor controller that monitors signal currents flowing through the wires/conductors of a signal line (EX1005, 1:26-30, 2:25-31, 17:20-21, 19:1-4), including by measuring these currents with a capacitive, magnetic or inductive sensor (*id.*, 3:21-24, 14:3-7; 15:8-11, 24:17-20), and modulating the intensity, frequency, color, or other illumination characteristic of a linear lighting element (optical light guide(s) or electroluminescent wire(s)) according to the signal currents. (*Id.*, 1:12-17, 2:22-3:3, 3:15-18, 6:1-4, 9:19-21, 9:23-27, 11:13-19, 14:15-

20, 18:8-13, 25:14-21.) The monitored signal currents power a device (e.g., headphones, loudspeaker, keyboard) in some embodiments. (*Id.*, 4:23-25, 17:34-18:2; *see also* Claim [1.a] above.)

Ground 2: The combination modifies Jablonski's current sensor and controller as needed to measure current in a power cable. The Jablonski controller then modulates illumination characteristics of the wire shaped illuminator to indicate this measured current. (*See* EX1003, ¶¶ 230-231.)

[1.d] *feeding the wire shaped illuminator with varying current or voltage corresponding to the electrical quantity measured in the conductor.*

Ground 1: Jablonski discloses this limitation. (*See* EX1003, ¶¶ 162-163.)

Jablonski discloses its controller modulating illumination of its linear lighting element according to signal currents measured in the wires/conductors of a cable (*see* Claims [1.a], [1.c] above) by varying the frequency and/or voltage of an alternating current signal applied to an electroluminescent wire (EX1005, 11:13-24, 25:14-26) or by outputting signals to control illumination of LEDs (*id.*, 17:20-28, 18:8-13) or other light sources for light guide(s) (*id.*, 5:26-34, 13:17-20, 20:1-12, 20:23-31, 24:9-10).

Ground 2: The combination relies on the Jablonski controller's modulation of a linear lighting element according to measured current as disclosed in Godard. (*See* EX1003, ¶¶ 232-233.)

**2. Claim 2**

*The arrangement of claim 1, wherein said wire shaped illuminator is arranged along said conductor.*

Grounds 1 and 2: Jablonski discloses this limitation. (See EX1003, ¶¶ 164-165, 234.) As depicted in each Figure in Jablonski, the linear lighting elements (optical light guide(s) or electroluminescent wire(s)) are arranged along the length of the monitored signal cable conductor. (EX1005, 1:26-33, 11:3-8, 13:17-19, *see also* Claim [1.b] above.) For example, in some embodiments Jablonski's light element(s) are attached with clips mounted to the appropriate cable. (EX1005, 5:10-23, 9:6-21, 22:1-6, Fig. 7.)

**3. Claim 3**

*The arrangement of claim 1, wherein said wire shaped illuminator is electroluminescent.*

Grounds 1 and 2: Jablonski discloses this limitation. (See EX1003, ¶¶ 120, 166-167, 235.) In some embodiments, Jablonski discloses linear electroluminescent, light elements. (E.g., EX1005, 11:9-31, 24:29-26:2, Fig. 11.)

**4. Claim 4**

*The arrangement of claim 1, wherein said wire shaped illuminator is an optical fiber.*

Grounds 1 and 2: Jablonski discloses this limitation. (See EX1003, ¶¶ 168-170, 236.) In some embodiments of Jablonski, the linear lighting elements are optical

“light guides” of various forms illuminated by one or more LEDs. (EX1005, 3:30-4:10, 5:26-6:4, 7:9-12, 7:18-29, 8:13-15, 19:24-20:14, 21:24-22:15, 22:27-24:10, Figs. 4-5, 7-10.) For example, one construction of Jablonski’s Fig. 4 embodiment “includes a light guide 16 comprising a core 17, e.g. a transparent polymer, a core cladding 18, e.g. a transparent layer of PTFE, and an outer cover 19, e.g. a transparent sleeve of PVC.” (*Id.*, 16:22-25.) These are examples of optical fiber. (EX1003, ¶¶ 85, 87, 120.)

**5. Claim 5**

*The arrangement of claim 1, wherein said controller further sends a control signal to control said wire shaped illuminator.*

Grounds 1 and 2: Jablonski discloses this limitation. (See EX1003, ¶¶ 171-172, 237.) The Jablonski controller sends control signals along control leads, control wires, *etc.* to a light source, like one or more LEDs (EX1005, 7:1-8, 17:20-28, 18:8-13, 20:32-21:4, 22:14-15), or applies a variable alternating current signal to electroluminescent wire(s) (*id.*, 11:13-24, 25:14-26) to modulate illumination characteristics of its linear lighting element. (See Claim [1.d] above.)

**6. Claim 6**

*The arrangement of claim 3, wherein said electroluminescent includes a central conductive wire coated with a phosphorus material coating and transmitter wires wrapped around it, and covered by a coating and a colored vinyl coat.*

Grounds 1 and 2: Jablonski discloses this limitation:

Thus, in one embodiment, the signal line could include a length of electroluminescent wire having a copper core, a phosphor coating about the core, one or more transmission wires around the coating, and one or more protective and/or colour-altering layers, e.g. PVC layers, around the core, coating and wires. The light controller will apply an a.c. signal between the copper core and transmission wire(s) in order to stimulate the phosphor coating and illuminate the line, and may vary the frequency and/or applied voltage to vary the light intensity. Colour may also be varied in some circumstances, e.g. by varying the frequency of the stimulating voltage, ...

(EX1005, 11:9-17; *see also id.*, 24:29-26:2; EX1003, ¶¶ 173-174, 238.)

**7. Claim 7**

*The arrangement of claim 1, wherein said controller comprises a processing arrangement and a measuring arrangement and a driver for driving said wire shaped illuminator receiving control signals from said processing arrangement.*

Ground 1: Jablonski discloses this limitation. (See EX1003, ¶¶ 175-178.)

In combination, Jablonski's microprocessor controller and capacitive, magnetic or inductive sensor(s) are a measuring arrangement and a processing arrangement. The sensor(s) continuously detect current in the wires/conductors of a signal line, including changes in current over time. (EX1005, 3:21-24, 15:8-11.) Jablonski discloses monitoring measured current with a microprocessor controller (*Id.*, 14:3-7, 24:17-20), that quantifies and processes this current to modulate the

linear lighting element (*id.*, 6:5-12, 9:10-12, 9:19-21, 11:5-6, 16:26-31, 17:20-23, 21:31-34).

The '829 patent discusses two types of drivers: inverter modules that apply up to 110-volts of alternating current to electroluminescent wires, and drivers that illuminate pulse controlled light sources like LEDs. (EX1001, 3:53-4:10.) Jablonski discloses these same drivers. In some embodiments, Jablonski's controller controls an inverter that applies 50 to 120-volts of alternating current to modulate illumination of electroluminescent wire. (EX1005, 11:9-24, 25:14-26.) In others, LEDs are illuminated and modulated by "suitable controllers." (*Id.*, 13:17-20, 17:20-23, 18:8-13.)

Ground 2: The combination relies on Godard's current sensor to measure current, and Jablonski's microprocessor controller to quantify, process, *etc.* this measured current and to drive illumination of Jablonski's linear lighting element. (See EX1003, ¶¶ 239-240.)

## 8. Claim 8

*The arrangement of claim 1, wherein said illumination characteristic is one or several of intensity, color or frequency.*

Grounds 1 and 2: Jablonski discloses this limitation. (See EX1003, ¶¶ 179-180, 241.) Jablonski modulates the intensity, color or frequency of illumination to indicate the level of measured currents through the wires/conductors of a signal

cable. (EX1005, 1:26-33, 11:3-6, 13:14-16.) “For example, the intensity of the light, the frequency and/or duration of light pulses and/or the colour (wavelength) of the light in the guides may be varied based on the signal frequencies or the like.” (*Id.*, 14:17-20.) (See Claims [1.a], [1.d] above.)

**9. Claim 9**

[9.a] *A cord comprises at least one electric wire and a substantially wire shaped illuminator at least partly arranged along an extension of said at least one electric wire,*

Ground 1: Jablonski discloses this limitation. (See EX1003, ¶¶ 181-182.) For example, Jablonski discloses:

a signal line, the line including **a side-emissive light guide extending along at least a part of said line**, a light source for illuminating the light guide, and a controller for controlling the light source based upon a signal on the line, e.g. based upon a signal current flowing therein. The signal line may include suitable **electrical conductors/wires along its length** for transmitting electrical signal current from one end of the line to the other.

(EX1005, 1:26-33 (emphases added); *see also id.*, 9:8-12, 9:24-27, 11:3-8, 11:32-12:2, 13:14-16, 17:20-23, 18:8-13, 21:31-34, 24:11-16.)

Ground 2: In the combination, Jablonski’s linear illuminators are integrated with or attached to a power cable. (See EX1003, ¶¶ 242-243.)

[9.b] *said substantially wire shaped illuminator having means for illumination when energized to indicate an electrical quantity, being one or several of power, current or voltage through the at least one electric wire,*

Ground 1: Jablonski discloses this limitation. (See EX1003, ¶¶ 183-185.) Jablonski discloses several variations of “linear lighting element[s]” (EX1005, 11:1) to illuminate the signal line, including one or more “light guides” illuminated by one or more LEDs (*id.*, 3:30-4:10, 5:26-6:4, 7:9-12, 7:18-29, 8:13-15, 16:22-25, 19:24-20:14, 21:24-22:15, 22:27-24:10, Figs. 4-5, 7-10), electroluminescent wire (*id.*, 11:9-19, 24:29-25:26, 26:1-2, Fig. 11), and electroluminescent tape (*id.*, 11:25-31, 25:27-26:2). As in the ’829 patent, Jablonski discloses inverters that apply alternating current to electroluminescent wires to energize them. (*Id.*, 25:20-24.)

The Jablonski controller (EX1005, 6:5-12) modulates the linear lighting element’s illumination characteristics, like intensity, frequency, or color according to signal currents in the signal line. (*Id.*, 2:22-28, 3:15-18, 11:13-19, 14:15-20, 18:8-13, 25:17-21.) In some embodiments, Jablonski’s signal cable with jack type plug carries electrical power, which is measured along with signal current (*id.*, 4:22-25, 17:34-18:2.) (EX1003, ¶¶ 84, 116-119, 124; EX1012, [0057]-[0058].)

Ground 2: The combination modifies Jablonski as necessary to measure current through a power cable. (See EX1003, ¶¶ 244-245.) For example, Godard discloses detecting electrical current flow through a power cord (EX1007, Fig. 5) or power cord adaptor (*id.*, Fig. 7) with a current sensor. (*Id.*, 2:58-64; 3:6-16.)

[9.c] wherein said substantially wire shaped illuminator indicates the current or voltage through said at least one electric wire when at least one illumination characteristic of said substantially wire shaped illuminator is controlled with respect to said electrical quantity by feeding the substantially wire shaped illuminator with varying current or voltage corresponding to the current or voltage through at least one electrical wire.

Grounds 1 and 2: Jablonski discloses this limitation. (See EX1003, ¶¶ 186-187, 246.) The Jablonski controller indicates the measured current by modulating the characteristics of the light, like its intensity, frequency, or color. (EX1005, 2:22-28, 3:15-18, 11:13-19, 14:15-20, 18:8-13, 25:17-21.) One way the controller modulates the illumination is to vary the frequency and/or voltage of signals applied to an LED or electroluminescent wire. (*Id.*, 11:13-24, 17:20-28, 18:8-13, 25:14-26.) (See Claims [1.a], [1.d], and [8] above.)

**10. Claim 10**

*The cord of claim 9, further comprising a substantially translucent coating, covering said at least one electric wire and substantially wire shaped illuminator.*

Grounds 1 and 2: Jablonski discloses this limitation in its light guide embodiments. “Signals output from the player 2 are received by the jack plug 25 and pass along the length of the electric line 6 through positive and negative signal wires 31 that pass through the jack plug housing 26 and along the light guides 16 within the outer cover 19” where “outer cover 19, [is] e.g. a transparent sleeve of PVC.”

(EX1005 at 16:22-25; 17:4-7; *see also id.*, 7:18-20, 17:17-19; EX1003, ¶¶ 188-189, 247.)

**11. Claim 11**

*The cord of claim 9, wherein said substantially wire shaped illuminator is an electroluminescent wire.*

Grounds 1 and 2: Jablonski discloses this limitation. (*See* Claim [3] above; EX1003, ¶¶ 166-167, 190, 248.)

**12. Claim 12**

*The cord of claim 9, wherein said substantially wire shaped illuminator is an optical fiber.*

Grounds 1 and 2: Jablonski discloses this limitation. (*See* Claim [4] above; EX1003, ¶¶ 168-169, 191, 249.)

**13. Claim 13**

*The cord of claim 9, wherein said substantially wire shaped illuminator indicates current or power through said at least one electric wire.*

Grounds 1 and 2: Jablonski and the combination disclose this limitation. (*See* Claim [1.a] above; EX1003, ¶¶ 156-157, 192, 250.)

**14. Claim 14**

[14.a] *A method of visually indicating an electrical quantity, being one or several of power, current or voltage through a conductor, the method comprising the steps of:*

Grounds 1 and 2: Jablonski and the combination disclose this limitation. (See Claim [1.a] above; EX1003, ¶¶ 156-157, 193, 251.)

[14.b] *energizing a substantially wire shaped illuminator and controlling at least one illumination characteristic of said substantially wire shaped illuminator with respect to said electrical quantity by measuring the electrical quantity and*

Grounds 1 and 2: Jablonski and the combination disclose this limitation. (See Claims [1.b], [1.c] above; EX1003, ¶¶ 158-161, 194, 252.).

[14.c] *feeding the substantially wire shaped illuminator with varying current or voltage corresponding to the current or voltage through the conductor.*

Grounds 1 and 2: Jablonski and the combination disclose this limitation. (See Claim [1.d] above; EX1003, ¶¶ 162-163, 195, 254.).

**15. Claim 15**

[15.a] *A device for providing a variable visual indication of consumption of electricity comprising:*

Ground 1: Jablonski discloses this limitation. (See EX1003, ¶¶ 196-197.)  
Jablonski discloses a broad class of signal cables for loudspeakers, headphones, music players, keyboards, game consoles, computer monitors, televisions, and printers, or as a replacement for standard cabling. (EX1005, 2:1-6, 13:9-13, 15:28-

31, 16:10-15, 17:1-3, 17:10-13, 22:16-19.) Some of these cables transmit power (e.g., phantom power) (*id.*, 4:23-25, 17:34-18:2). (EX1003, ¶¶ 84, 118.) Whether audio signal current, data signal current, or current powering a device, measured currents are “consumed” by the receiving device. (EX1003, ¶¶ 52-57, 119.) (*See* Claim [1.a] above.)

Ground 2: The combination measures current with a current sensor as discussed in Godard. (EX1007, 2:61-64, 3:13-16; 6:19-24.) Jablonski is modified, as needed, with an appropriate capacitive, magnetic or inductive current sensor (*id.*, 4:39-46, 4:50-64) to measure current through a power cable, and to control illumination of Jablonski’s linear lighting element according to this measured current. (*See* Claim [1.a] above; EX1003, ¶¶ 254-255.)

[15.b] *a measurement unit, disposed between an external power source and a device which consumes said electricity, configured to measure a variable electrical quantity associated with said electricity; and*

Ground 1: Jablonski discloses this limitation. (*See* EX1003, ¶¶ 198-199.) Jablonski discloses a capacitive, magnetic or inductive sensor(s) that together with a microprocessor controller detects and quantifies (*i.e.*, measures) current in a signal cable connected to a consuming device. (EX1005, 3:21-24, 14:3-7, 15:8-11, 24:17-20; *see* Claim [7] above.) For example, Jablonski discloses signal cables from a music player, amplifier, or game console/computing device to corresponding accessories, like a microphone, loudspeaker, headphones, instrument, controller,

keyboard, or display (EX1005, 13:4-13, 15:12-15, 15:28-31, 16:10-12, 21:28-31, Figs. 1-3), and a light guide attachment that is adapted “for placement between an electrical device and a standard signal cable” (*id.*, 5:12-19). Some of these cables transmit electrical energy (*id.*, 4:23-25, 17:34-18:2; EX1003, ¶¶116-119) to the connected device. (*see* Claim [15.a] above.)

Ground 2: The combination measures current in a power cable connecting a consuming device to an external power source as disclosed in Godard. (*See* EX1003, ¶¶ 256-257.) For example, Godard discloses power cord and power cord adaptor embodiments that provide a plug and socket for connecting an electrical device to an external power source. (EX1007, 2:58-61, 3:6-12, 6:11-16, 6:29-35, 6:49-53, Figs. 5, 7.) The combination indicates this current as disclosed in Jablonski.

[15.c] *a controller connected to said measurement unit and configured to receive said measured variable electrical quantity from said measurement unit, and further configured to control a plurality of illumination devices based on said received said measured variable electrical quantity;*

Grounds 1 and 2: Jablonski discloses this limitation. (*See* Claims [1.c], [1.d] above; EX1003, ¶¶ 160-163, 200-201, 258.) For example, Jablonski’s controller receives signal-current measurements from a capacitive, magnetic or inductive sensor(s). (EX1005, 3:21-24, 14:3-7, 15:8-11, 24:17-20.) Jablonski discloses control of plural LEDs and light guides (*id.*, 1:18-21, 5:26-34, 13:17-20, 18:8-22, 20:3-31, 23:17-34) or “electroluminescent cables or tapes.” (*id.*, 24:29-31.)

*[15.d] wherein said plurality of illumination devices output light which varies over time as a function of said measured variable electrical quantity.*

Grounds 1 and 2: Jablonski discloses this limitation. (See EX1003, ¶¶ 202-203, 259.) One way the Jablonski controller modulates the illumination characteristics of LED(s) or electroluminescent wire(s) is to vary the frequency and/or voltage of signals applied to them according to variations in the measured current. (EX1005, 1:26-30; 2:25-28, 11:3-6, 11:13-24, 13:14-16 17:20-28, 18:8-13, 25:14-26; see Claims [1.a], [1.d], [9.c], [8] above; see also EX1003, ¶¶ 115, 121, 156-157, 162-163, 179-180.)

#### **16. Claim 16**

*The device of claim 15, wherein said plurality of illumination devices each comprise a copper wire coated with a phosphorous material and two transmitter wires wrapped around the copper wire.*

Grounds 1 and 2: Jablonski discloses this limitation for its electroluminescent wire embodiments. (See Claims [3], [6] above; EX1003, ¶¶ 166-167, 173-174, 204-205, 260.) For electroluminescent wire, Jablonski discloses:

The electroluminescent wire 50 is formed from a central copper core 51 that is coated in phosphors, a connection line 52 for connecting the copper core 51 with the controller 28, a pair of transmitter wires 53 that are connected together and that wrap around the phosphor coating along the length of the core 51, a vinyl protective layer 54 and an outer protective layer 55.

(EX1005, 25:7-12.)

**17. Claim 17**

*The device of claim 15, wherein said light output by said plurality of illumination devices varies in at least one of intensity, color or frequency over time based on said measured variable electrical quantity.*

Grounds 1 and 2: Jablonski and the combination disclose this limitation. (See Claims [8], [15.d] above; EX1003, ¶¶ 179-180, 202-203, 206, 261.)

**VIII. GROUND 3: CLAIMS 1-5, 7-8, 14 ARE  
OBVIOUS OVER BORDEN IN VIEW OF CURRIE**

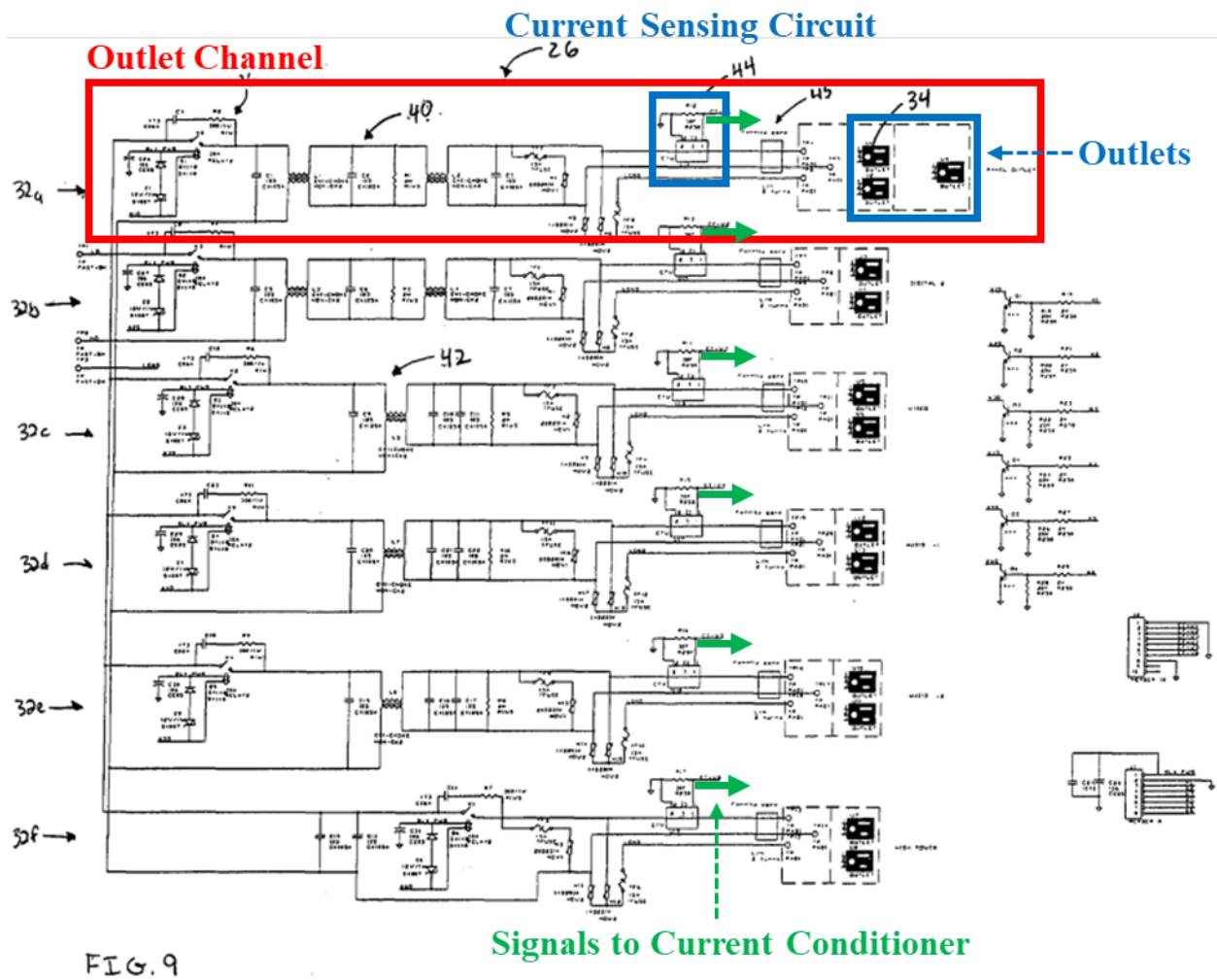
**A. Borden**

Borden (EX1009) is prior art under at least 35 U.S.C. § 102(e) (pre-AIA) as its U.S. Patent Application No. 10/752854 (EX1010) was filed January 7, 2004, about 26 months before the PCT application date of the '829 patent. During prosecution Borden's originally-filed figures (EX1009, Figs. 1-10), were updated with formal figures without adding new matter. (EX1010, 5-8, 20-21, 37-42.) U.S. Patent No. 7,233,086 to Borden issued with these updated figures. (EX1011.) The Borden reference (U.S. Publication 2005/0146827) relied on by this Petition includes originally-filed figures and sufficiently discloses the aspects of Borden that render obvious claims 1-5, 7-8, and 14 and anticipate claims 15 and 17 of the '829 patent. (EX1009.) As authenticated by Dr. Woods, Borden's formal figures 5-9 provide improve clarity and readability and are structurally and functionally

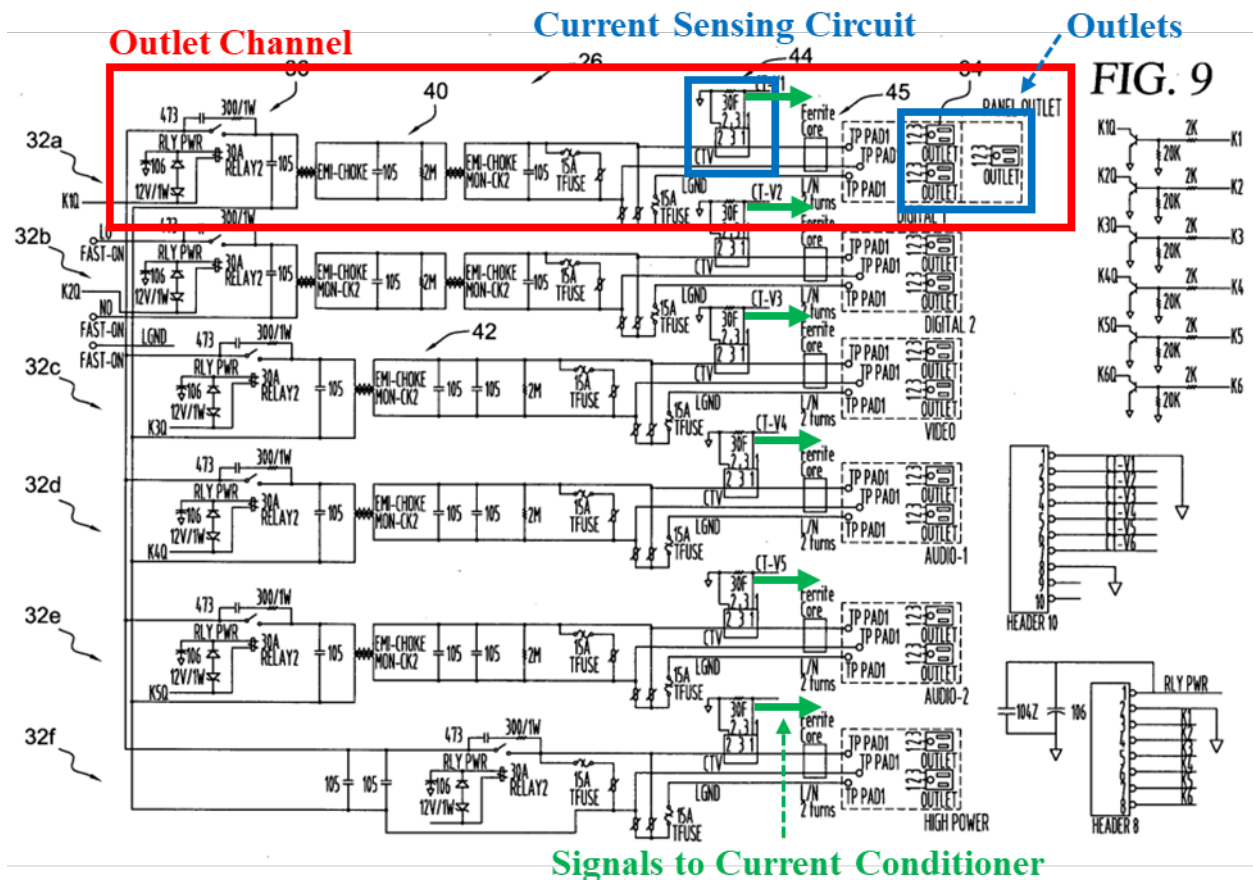
equivalent to originally-filed Borden figures 5-9. (EX1003, ¶¶ 133-139; *comparing* originally-filed figures (EX1009, Figs. 5-9) *with* updated formal figures (EX1011, Figs. 5-9).)

Borden discloses measuring the current at an outlet socket, generating various signals according to this measurement, and modulating the illumination of LEDs to indicate the measured current. Borden provides a power line conditioner (*e.g.*, power strip) that measures current delivered through an outlet socket to an electrical device and a display that visually indicates those current measurements. (EX1009, [0019], [0029].)

Borden's Fig. 1, illustrates the preferred embodiment of power line conditioner apparatus 10 with current signal conditioner 18, system controller 20, user interface controller 22, and outlet channels 26. (*Id.*, [0020].) The circuitry of this embodiment's parallel outlet channels is illustrated in Fig. 9:



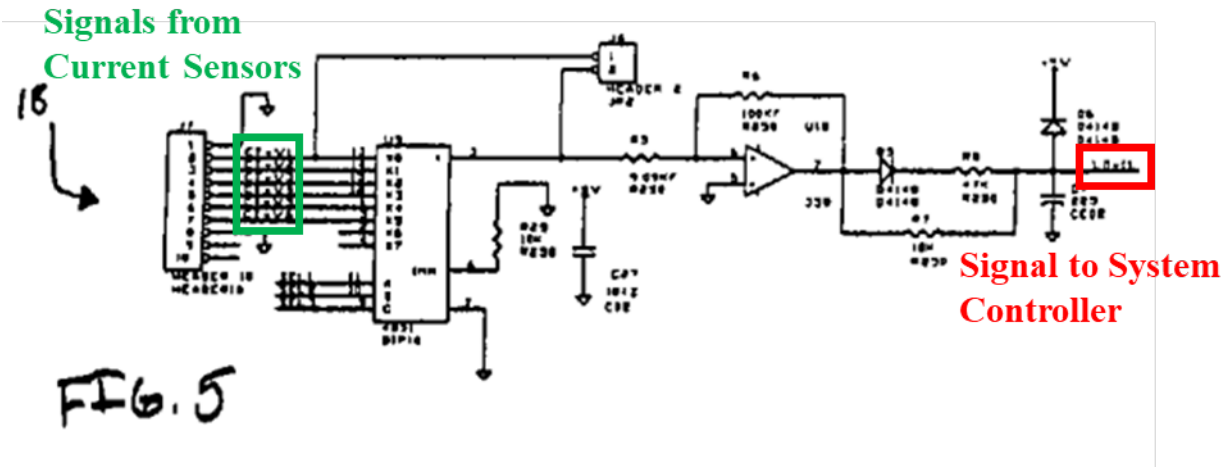
EX1009, Fig. 9 (annotated)



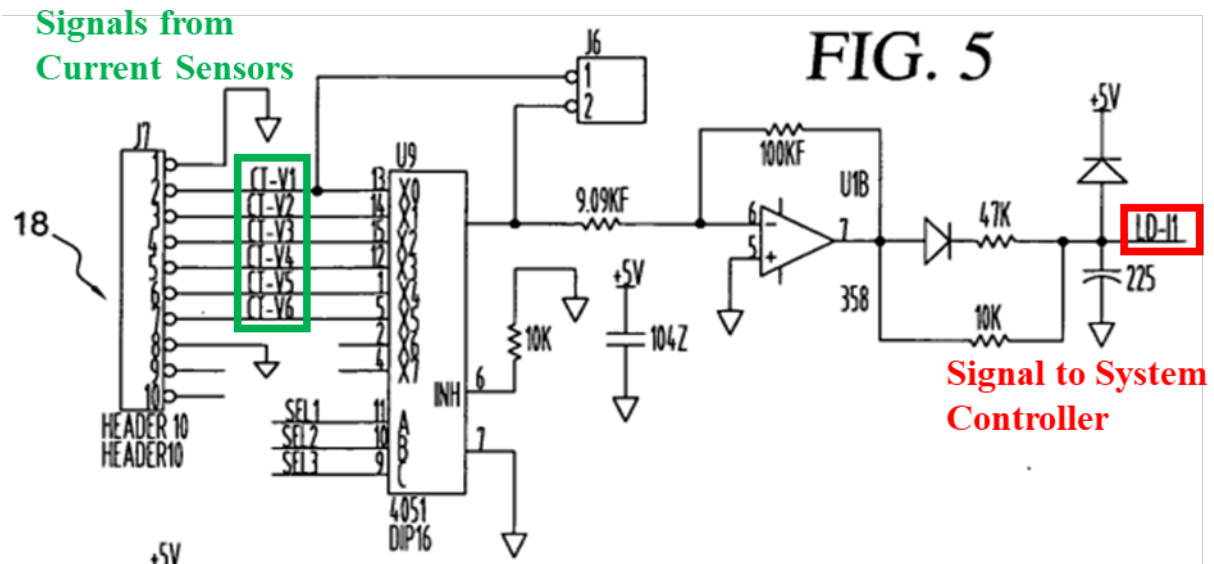
EX1111, Fig. 9 (annotated)

Borden discloses current sensing circuits 44 located on the power conditioner's outlet channels close to electrical outlets 34 to accurately measure current delivered to these outlets and the electrical devices they power. (EX1009, [0029]; EX1003, ¶ 266.)

As part of the same embodiment, Borden Fig. 5 discloses current signal conditioner 18 which is electrically connected with current sensing circuits 44 disclosed in Fig. 9 and receives an alternating current signal from these current sensing circuits. (EX1009, [0024].)



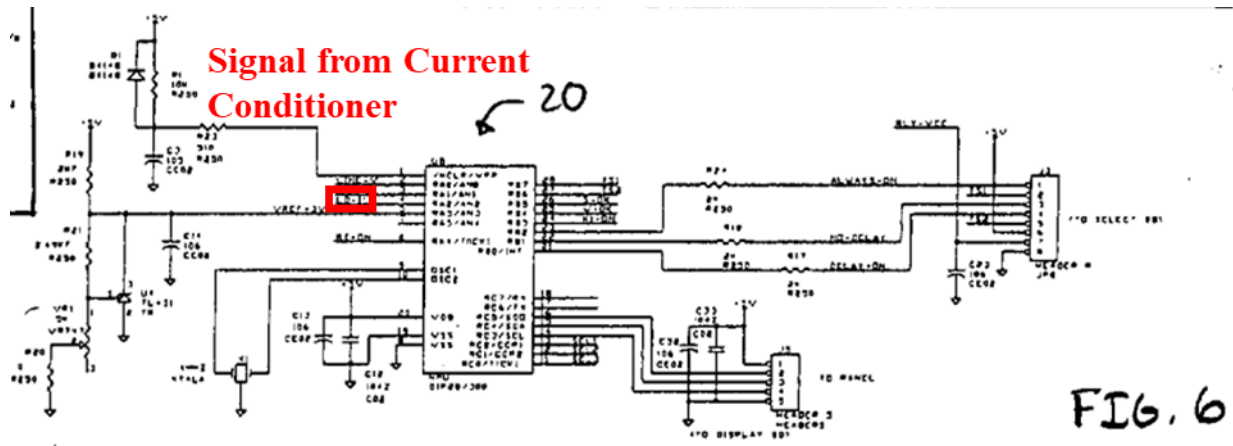
EX1009, Fig. 5 (annotated)



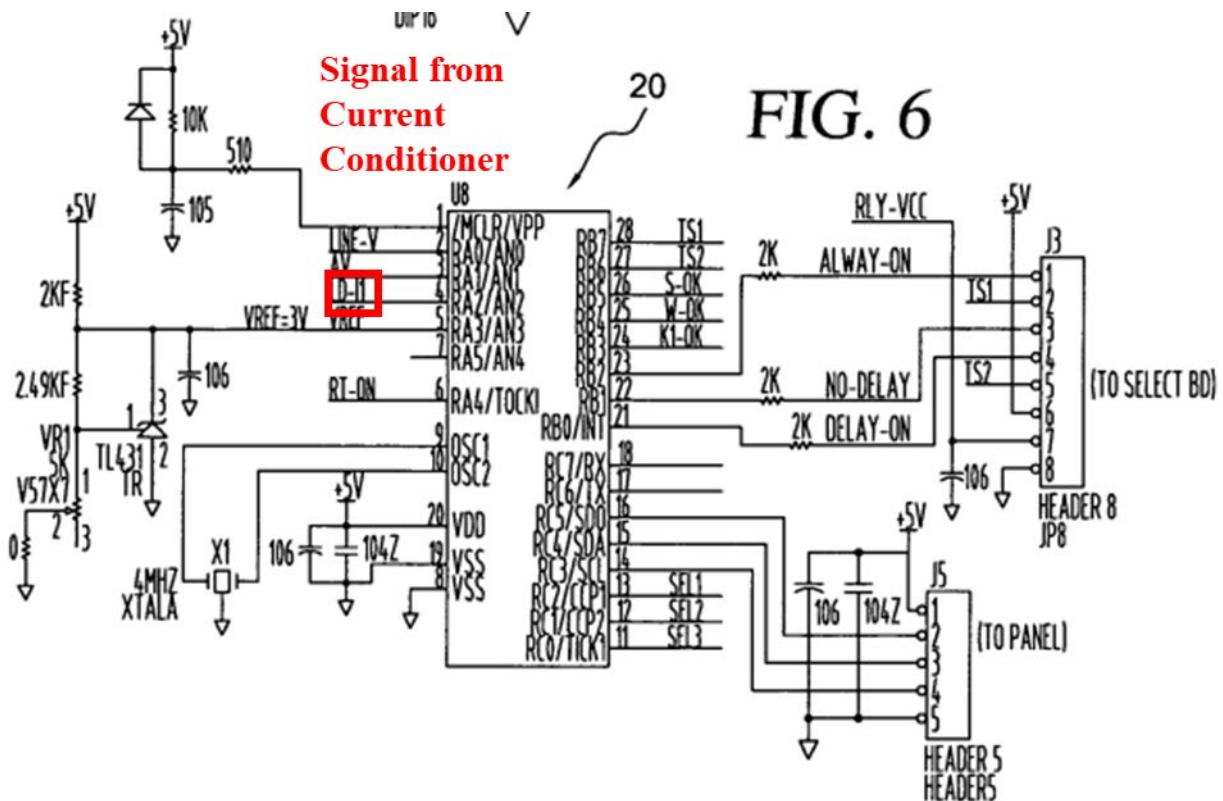
EX1011, Fig. 5 (annotated)

The current signal conditioner converts the signal from current sensor 44 to a signal that is transmitted to system controller 20. (EX1009, [0024]; EX1003, ¶¶ 130, 267-268.)

As part of the same embodiment, system controller 20, which includes a processor, is illustrated in Fig. 6. (EX1009, [0025].)



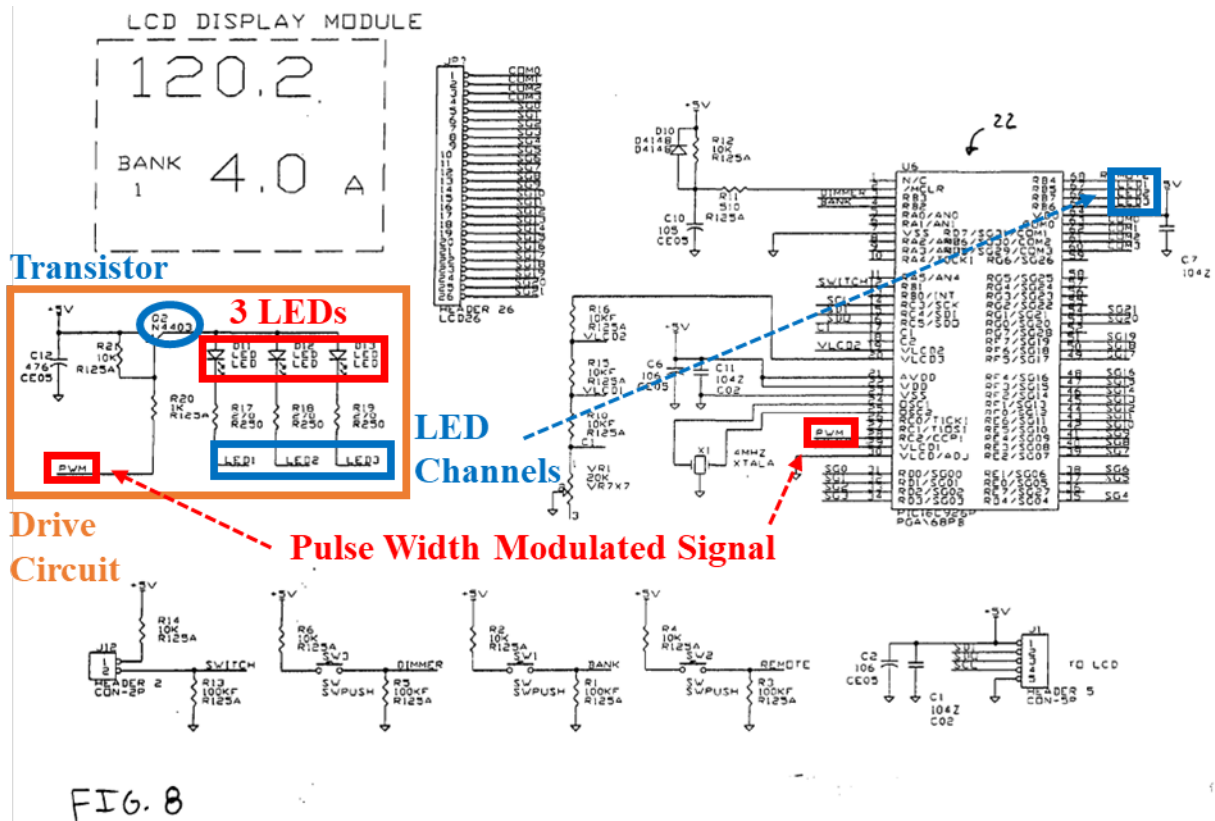
EX1009, Fig. 6 (annotated)



EX1011, Fig. 6 (annotated)

The Borden system controller 20 receives proportional direct current signals from current signal conditioner 18, processes those signals, and transmits control signals to user interface and display controller 22. (EX1009, [0025]; EX1003, ¶¶ 269-270.)

As part of the same embodiment, Borden Fig. 8 illustrates user interface and display controller 22, which displays a visual indication of measured current. (EX1009, [0027]; EX1003, ¶ 271.)



EX1009, Fig. 8 (annotated)



EX1011, Fig. 8 (annotated)

User interface and display controller 22 generates a “PWM” signal that controls transistor N4403 to power a series of three LEDs on channels LED 1, LED 2, and LED 3. (EX1003, ¶¶ 130, 132, 272; *see also* ¶¶ 74, 131.) A PWM signal is a pulse width modulated control signal with “on” pulses and “off” pulses that vary in duration at a set frequency (*e.g.*, 250 Hz). (*Id.*, ¶¶ 72-73, 273.) The proportionate duration of the “on” pulse to the pulse width is referred to as the “duty cycle.” (*Id.*, ¶¶ 75, 273.) A POSITA would recognize that variations of the PWM “duty cycle” would vary the average current and voltage provided per cycle and over time. (*Id.*, ¶¶ 76-77, 274.) For example, a 50% duty cycle at a frequency of 250 Hz would

provide current and voltage for 2 milliseconds every 4 milliseconds. (*Id.*, ¶¶ 81-83, 275.) The Borden LED drive circuit switches transistor N4403 to illuminate LEDs for the duration of the PWM “on” pulse (“on” is low-voltage in this embodiment). (*Id.*, ¶¶ 78-80, 276; *see also* ¶ 132.) As was known in the art, modulating LEDs according to a PWM drive signal varies the average illumination over time and causes the LEDs to appear brighter and dimmer according to the “duty cycle.” (*Id.*, ¶¶ 81-82, 132, 277.)

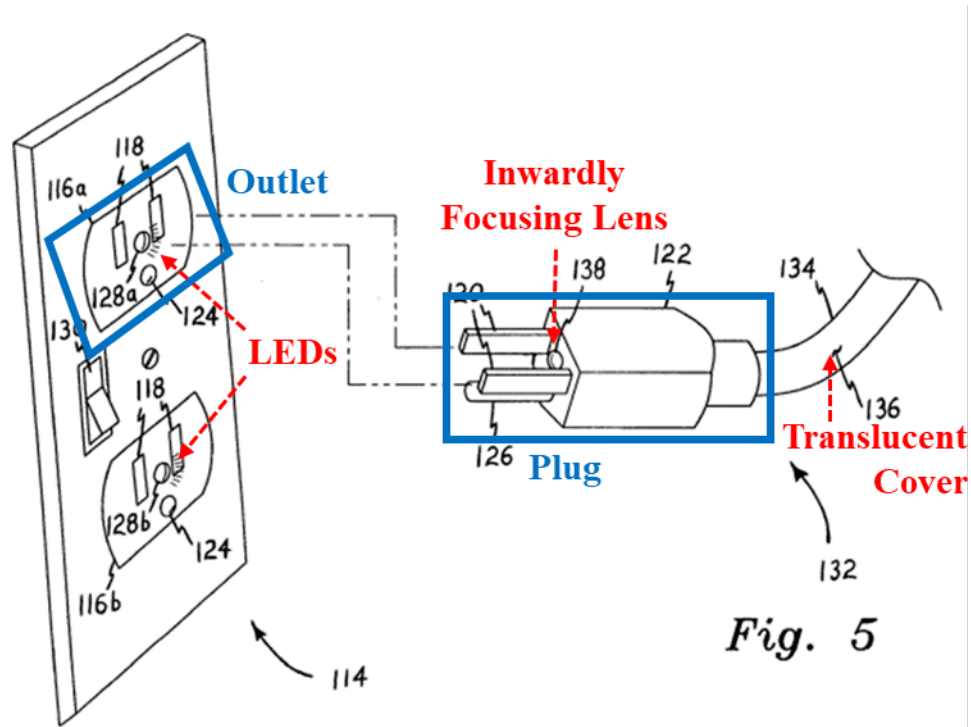
**B. Currie**

Currie (EX1012) is prior art under at least 35 U.S.C. § 102(e) (pre-AIA) as its U.S. patent application (EX1013) was filed September 24, 2004, about 17 months before the PCT application date of the ’829 patent. As described above (Section V.A.3.b, *supra*), Currie describes several ways to illuminate a power cable for safety or decorative reasons, including illuminating a translucent outer cover with one or more LEDs (EX1012, [0048]; *see also* EX1003, ¶ 122.)

Specifically, Currie discloses illuminated electrical cords that encompass an electrical conductor having a translucent cover (*e.g.*, sheath, coating, wrap, sleeve) that receives illumination from a lighting element (*e.g.*, LED) and emits light radially along the length of the cord. (EX1012, [0003], [0029], [0048]-[0049], [0065].) In several embodiments, the illuminating light source is located within an “electrical outlet [...] or power strip to which the illuminated electrical cord is connected,” the

outlet or power strip having “means for transmitting light to the illuminated electrical cord[].” (*Id.*, [0031]-[0032]; EX1003, ¶ 123.)

Currie Fig. 5 illustrates an electrical outlet embodiment, and Currie Fig. 8 illustrates a power strip embodiment.



EX1012, Fig. 5 (annotated)

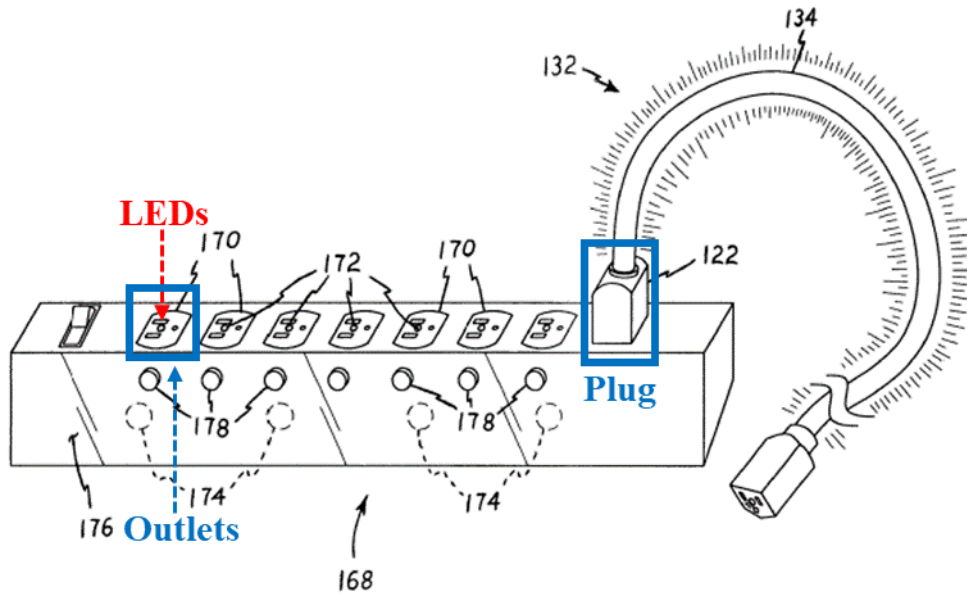


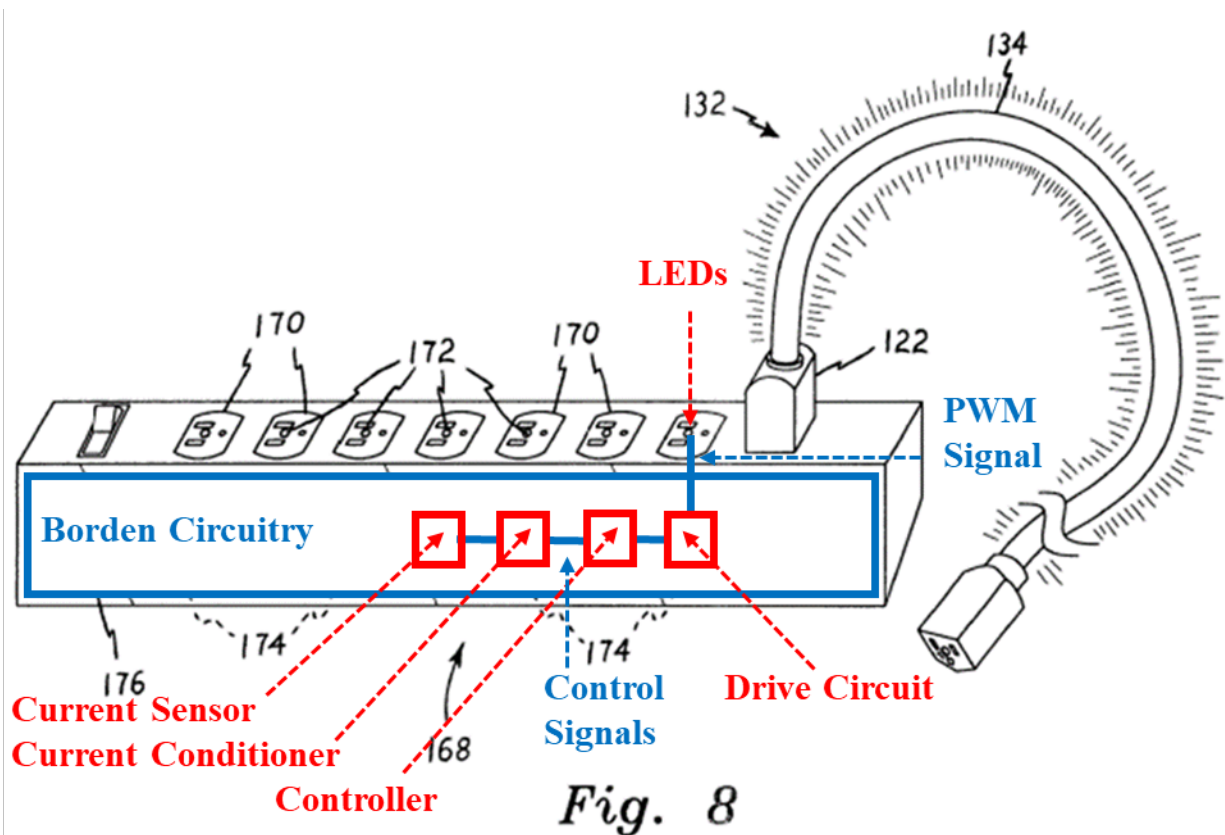
*Fig. 8*

EX1012, Fig. 8 (annotated)

Currie's outlet and power strip embodiments both include electrical cord assembly 134 with male plug 122, which are plugged into the corresponding outlet sockets of each embodiment. (*Id.*, [0066], [0068], [0075].) In the outlet embodiment illustrated by Fig. 5, illuminated cord 134 is plugged in such that plug 122 abuts electrical receptacle 116a, inwardly-focusing lens 138 receives light from light source (*e.g.*, LED) 128, and focuses it through plug 122 to illuminate the translucent cover 136 of the cord assembly 134. (*Id.*, [0068]; EX1003, ¶ 292.) Similarly, in the power strip embodiment illustrated by Fig. 8, electrical receptacles 170 have lights 172 positioned to shine into male plug 122, which has an internally-directed lens that illuminates cord assembly 132. (EX1012, [0075]; EX1003, ¶¶ 123, 293.)

### C. Combining Borden and Currie

The Borden-Currie combination replaces the Currie circuitry in the Currie power strip with the Borden circuitry, with the Borden circuit providing a current-indicating level of illumination to the Currie LEDs 172 (EX1012, Fig. 8) to illuminate the Currie cord according to measured current.



Power Strip Embodiment of Borden-Currie Combination

(EX1003, ¶ 295.) The combination incorporates the Borden current sensing circuit to measure the current delivered to Currie's illuminated cord assembly through Currie's illuminated electrical receptacles. In some embodiments of the combination, the Borden current sensor encompasses a current transformer.

(EX1003, ¶¶ 99-101, 130, 298.) As in Borden, a current signal conditioner (Borden Fig. 5) receives an alternating current signal from Borden's current sensing circuit (Borden Fig. 9) and generates a proportional direct current signal that is converted to a PWM signal by one or more controllers (Borden Figs. 6, 8). This PWM signal drives an LED by modulating a transistor (*e.g.*, N4403) as illustrated by the circuit diagram of Borden's user interface and display controller (Borden Fig. 8). (EX1003, ¶¶ 272-277.)

In this combination, Borden's PWM signal drives LEDs in each of Currie's outlet sockets, where these LEDs are positioned to shine into the internally-directed lens of a plug to illuminate the translucent cover of Currie's illuminated cord assembly along its length. (*See* EX1003, ¶¶ 123, 296-297.)

**D. Motivation To Combine Borden  
And Currie And Expectation Of Success**

Borden and Currie both provide visual indication of power conditions. The Borden-Currie combination combines Borden's visual quantification of delivered current with Currie's qualitative indication that current is flowing through an illuminated cord. (*Compare* EX1009, [0003] (Borden seeks to "provide a visual indication [...] so that the user can determine if the electronic devices are receiving power at optimal voltage and current") *with* EX1012, [0006] (Currie seeks to "indicate the presence of an electrical supply or current running through the cord").)

POSITAs were motivated to illuminate a power cord with the Borden-Currie combination to maintain Borden's visual quantification of current (EX1009, [0021], [0048]) while also advancing Currie's safety purpose of alerting users to tripping hazards, unsafe overload conditions, or whether safety or medical equipment is receiving appropriate power, especially in low light environments. (EX1012, [0048].) Currie is an especially natural combination with Borden because Currie's illuminated cord assembly utilizes an LED that may be located in an outlet (*Id.*, [0010]) which may be located on the exterior of a power strip (*id.*, [0075]), and Borden controls the illumination of LEDs on the exterior of a power strip (*compare* EX1009, [0019], [0027], Fig. 8). (*See* EX1003, ¶¶ 105, 122, 129, 299-301.)

POSITAs would have had a high expectation of success placing Borden's circuitry inside Currie's power strip, at least because Borden already places its circuitry within a multi-outlet power conditioner. Borden discloses various surge suppression, outlet channel, current sensing, control, and display circuits that are not limited to a specific physical package. (EX1009, [0019]-[20], Fig. 1.)

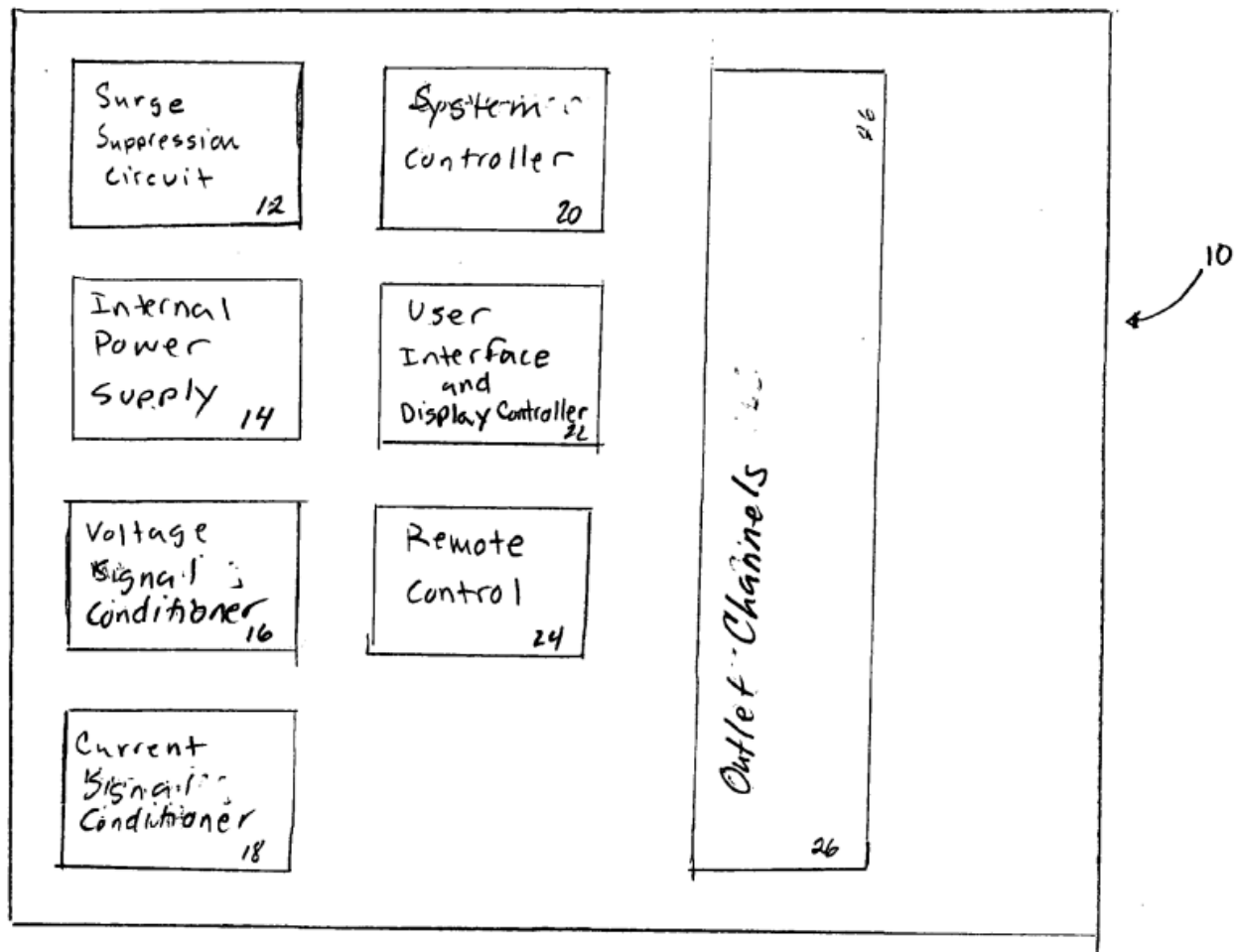


FIG. 1

EX1009, Fig. 1

POSITAs would have incorporated this circuitry into a variety of multi-outlet power apparatuses, including a power strip as discussed in Currie (EX1012, [0075], Fig. 8). Once Borden's circuitry was incorporated into a power strip, a POSITA would merely have needed to position the LEDs of Borden's user interface and display controller as illustrated in Currie's power strip embodiment. (EX1012, [0075], Fig. 8.) As Borden does not limit the location of LEDs and Currie discloses specific

locations, this would have been within a POSITA's level of skill. (EX1003, ¶¶ 109-112, 123, 302-304.)

**E. Detailed Mapping Of Borden And Currie To Claims**

**1. Claim 1**

[1.a] *An arrangement for visual indication of an electrical quantity, being one or several of power, current or voltage through a conductor,*

Borden discloses this limitation. (See EX1003, ¶¶ 305-308.) Borden discloses displaying current actually received by connected electronic devices (EX1009, [0004]) by measuring the current delivered to these devices through an electrical outlet (*id.*, [0029]) and visually indicating this measured current with a connected display. (*Id.*, [0006], [0019].) For example, the circuit diagram of Borden's user interface and display controller (*id.*, Fig. 8) illustrates LED(s) driven by a PWM signal to display "a visual indication of current and voltage measurements" (*id.*, [0027]). Borden indicates current through a conductor because electrical devices connect to electrical outlets through a cord, cable, or other conductive wiring. (See EX1003, ¶¶ 39-43.)

The combination projects Borden's visual indication of measured current delivered to an electrical outlet onto an illuminated power cord plugged into this outlet as disclosed in Currie. In Currie's power strip embodiment, an LED positioned within an electrical outlet shines into the inwardly-focusing lens of an abutting plug

and onto the translucent cover of a connected power cord to illuminate that cord along its length. (EX1012, [0068], [0075], Fig. 8.) In the combination, this LED is illuminated according to the current delivered to its encompassing outlet by the PWM signal from Borden's user interface and display controller.

[1.b] *wherein the arrangement comprises a substantially wire shaped illuminator, and*

Currie discloses this limitation. When Currie's illuminated cord assembly is plugged into the socket of Currie's electrical outlet or power strip embodiments, the LED within this socket illuminates the cord. (EX1012, [0068], [0075], Figs. 5, 8.) Currie's illuminated electrical cords have a cover, coating, wrap, or sleeve of optically-transmissive material that receives and radially re-radiates light along the length of the cord. (*Id.*, [0049], [0064]-[65], [0067], Figs. 1A, 2-4; *see* EX1003, ¶ 309.) Together, Currie's illuminated cord and illuminating LED form a substantially wire shaped illuminator that is linear, elongated, and has a cylindrical cross-section.

The '829 patent provides an optical fiber embodiment of a wire shaped illuminator (EX1001, 2:17-18), and the '829 patent's use of the term "optical fiber" contemplates side-emissive light guides. (Section VI.A.2, *supra*.) Optical fibers and light guides require a light source for illumination. (*See* EX1003, ¶¶ 85, 87, 109, 111.) Indeed, the '829 patent contemplates connecting an LED to one end of an optical fiber for illumination. (EX1001, 3:62-64.) Interpreting this claim limitation

to encompass the '829 patent's embodiment of an optical fiber and illuminating LED as a wire shaped illuminator, it likewise encompasses Currie's structurally equivalent illuminated cord assembly with illuminating LED. (EX1003, ¶ 123.)

[1.c] *a controller for control (sic) at least one illumination characteristic of said wire shaped illuminator with respect to said electrical quantity by measuring the electrical quantity, and*

The Borden-Currie combination discloses this limitation. (See EX1003, ¶¶ 310-311.) Borden discloses a user interface and display controller that displays an indication of current measurements. (EX1009, [0027], *see also* [0019].) The circuit diagram for the user interface and display controller illustrates LEDs that are driven by a PWM signal to a transistor drive circuit (*id.*, Fig. 8). These LEDs will dim and brighten according to the PWM duty cycle. The combination relies on Borden's circuitry to control the LED that projects light onto an illuminated electrical cord as disclosed in Currie.

[1.d] *feeding the wire shaped illuminator with varying current or voltage corresponding to the electrical quantity measured in the conductor.*

The Borden-Currie combination discloses this limitation. Together, Currie's illuminated cord and illuminating LED form a substantially wire shaped illuminator. (See Claim [1.b] above.)

In the combination, illumination of the illuminated cord assembly is controlled by the PWM signal from Borden's user interface and display controller.

The PWM signal illuminates the cord assembly's illuminating LED according to measured current by driving a transistor drive circuit with a variable "duty cycle." Variation of this "duty cycle" varies the average amount of current and voltage provided to the LED per cycle and over time. (See EX1003, ¶¶ 77, 274, 313.) Borden's current sensor measures current through the conductor elements (e.g., wires) of the illuminated cord because it measures current delivered to the outlet socket and received by connected devices (EX1009, [0029]), and the illuminated cord is plugged into and receives power from the corresponding socket (EX1012, [0066]-[67]; see EX1003, ¶ 314). (See Claim [1.a] above.)

## 2. Claim 2

*The arrangement of claim 1, wherein said wire shaped illuminator is arranged along said conductor.*

Currie discloses this limitation. Currie's illuminated electrical cords have a coating, wrap, or sleeve of optically-transmissive material. (See Claim [1.b] above.) This optically-transmissive material either comprises or is applied to the insulating cover of the electrical conductor elements (i.e., wire) of an electrical cord (EX1012, [0049], [0064]-[65]) to illuminate the cord substantially along its length. (*Id.*, [0003]; see EX1003, ¶ 315.)

3. **Claim 3**

*The arrangement of claim 1, wherein said wire shaped illuminator is electroluminescent.*

Currie and the combination disclose this limitation. In addition to “[l]uminescence resulting from a high-frequency discharge through a gas or from application of alternating current to a layer of phosphor” (EX1016, 240), electroluminescence may denote the “[d]irect conversion of electrical energy into light energy [...]; for example, photoemission as a result of electron-hole recombination in the pn junction.” (EX1016, 240.) “Normal LEDs are *pn* junction diodes” which generate photons that radiate outwards from the *pn* junction when the LED is active. (EX1022, 23-24.) Under this definition, LEDs are electroluminescent. (EX1003, ¶¶ 65-70, 316; EX1024, 35-1.)

Borden and Currie each disclose LED illumination. (EX1009, Fig. 8; EX1012, [0051].) In the combination, illumination from LEDs positioned according to Currie’s power strip embodiment (EX1012, [0075]-[76], Fig. 8) illuminate an electrical cord as disclosed in Currie. (*Id.*, [0053], [0075], Fig. 5; *see* EX1003, ¶¶ 315-316.)

4. **Claim 4**

*The arrangement of claim 1, wherein said wire shaped illuminator is an optical fiber.*

Currie discloses an electrical cable that is illuminated by a longitudinal shell, spirally-wrapped striped sheet, or braided sleeve of translucent material. (EX1012, [0064]-[65], Figs. 2-4.) The braided sleeve is composed of “hollow core polyethylene rope.” (*Id.*, [0065].) Each is an example of optical fiber, which was known in the art and commonly implemented to transmit light (*id.*, [0010], [0020], [0023]). (See EX1003, ¶¶ 85-87, 107, 319.)

5. **Claim 5**

*The arrangement of claim 1, wherein said controller further sends a control signal to control said wire shaped illuminator.*

The Borden-Currie combination discloses this limitation. The PWM control signal from Borden’s user interface and display controller controls illumination of Currie’s illuminated cord assembly through the LED light positioned within outlets of Currie’s power strip embodiment. (See EX1003, ¶ 320; Claims [1.a], [1.c], [1.d] above.)

**6. Claim 7**

*The arrangement of claim 1, wherein said controller comprises a processing arrangement and a measuring arrangement and a driver for driving said wire shaped illuminator receiving control signals from said processing arrangement.*

The Borden-Currie combination discloses this limitation. Borden has a current sensing circuit that measures current delivered to an electrical outlet (EX1009, [0029]), and controllers that receive signals indicative of measured current. (*Id.*, [0024]-[25], [0027], [0029].) The system controller processes this signal (*id.* [0025]), and the user interface and display controller provides a PWM signal that drives an LED drive circuit (*i.e.*, driver) (*id.*, [0027]) to illuminate the cord assembly as disclosed by Currie's power strip embodiment (EX1012, [0075]). (*See* EX1003, ¶ 321; Claims [1.a], [1.c] above.)

**7. Claim 8**

*The arrangement of claim 1, wherein said illumination characteristic is one or several of intensity, color or frequency.*

The Borden-Currie combination discloses this limitation. LEDs driven by a pulse width modulated signal appear to brighten and dim (*i.e.*, change intensity) according to the PWM signal's duty cycle. (*See* EX1003, ¶ 81-82, 277, 322; *see* Claim [1.c] above.)

**8. Claim 14**

[14.a] *A method of visually indicating an electrical quantity, being one or several of power, current or voltage through a conductor, the method comprising the steps of:*

Borden and the combination disclose this limitation. (See Claim [1.a] above; EX1003, ¶¶ 305-308, 323.)

[14.b] *energizing a substantially wire shaped illuminator and controlling at least one illumination characteristic of said substantially wire shaped illuminator with respect to said electrical quantity by measuring the electrical quantity and*

The Borden-Currie combination discloses this limitation. (See Claims [1.b], [1.c] above; EX1003, ¶¶ 309-312, 324.)

[14.c] *feeding the substantially wire shaped illuminator with varying current or voltage corresponding to the current or voltage through the conductor.*

The Borden-Currie combination discloses this limitation. (See Claims [1.d] above; EX1003, ¶¶ 313-314, 325.)

**IX. GROUND 4: CLAIMS 15 AND 17 ARE ANTICIPATED BY BORDEN**

**A. Borden**

This ground relies on Borden (EX1009) as discussed in Ground 3 above. (Section VIII.A, *supra*.)

**B. Detailed Mapping of Borden to Claims**

**1. Claim 15**

*[15.a] A device for providing a variable visual indication of consumption of electricity comprising:*

Borden discloses this limitation. (See EX1003, ¶¶ 278-279.) Borden's current sensing circuit 44 is positioned close to electrical outlets 34 in order to measure current "actually delivered to" (*i.e.*, consumed by) powered electrical devices. (EX1009, [0029].) Borden further discloses one or more displays "electrically connected to the current measuring circuit to provide a visual indication of current measurements" (*id.*, [0019]), including the user interface and display controller 22 in Fig. 8. (*Id.*, [0027].) (See Claim [1.a] above.)

*[15.b] a measurement unit, disposed between an external power source and a device which consumes said electricity, configured to measure a variable electrical quantity associated with said electricity; and*

Borden discloses this limitation. (See EX1003, ¶¶ 280-281.) Borden discloses that power conditioner 10 receives power from a standard wall outlet or another power source. (*Id.*, [0020].) Current sensing circuit 44 is disposed between this power source and electrical outlets 34 to measure current delivered to each of these outlets and the devices they power. (*Id.*, [0029], Fig. 9.)

[15.c] *a controller connected to said measurement unit and configured to receive said measured variable electrical quantity from said measurement unit, and further configured to control a plurality of illumination devices based on said received said measured variable electrical quantity;*

Borden discloses this limitation. (See EX1003, ¶¶ 282-284.) Borden’s current signal conditioner 18 is electrically connected to and receives an alternating current signal from current sensing circuit 44, and transmits a proportional direct current signal to electrically connected system controller 20. (*Id.*, [0024], Figs. 5, 6, 9.) System controller 20 processes this direct current signal and transmits a control signal to user interface and display controller 22. (*Id.*, [0025].) As illustrated in Fig. 8, user interface and display controller 22 drives three LEDs with a PWM signal to “provide[] a visual indication of current and voltage measurements” (*id.*, [0027], Fig. 8). (EX1003, ¶¶ 132, 272-276.)

[15.d] *wherein said plurality of illumination devices output light which varies over time as a function of said measured variable electrical quantity.*

Borden discloses this limitation. (See EX1003, ¶¶ 285-286.) The three LEDs illustrated in Fig. 8, are driven by a PWM signal from user interface and display controller 22. (EX1009, Fig. 8.) A POSITA would recognize that illumination of these LEDs would vary according to the duty cycle of the PWM signal to “provide[] a visual indication of current and voltage measurements” (*id.*, [0027]). (EX1003, ¶ 81-82, 277; see Claims [1.c], [1.d] above.)

**2. Claim 17**

*The device of claim 15, wherein said light output by said plurality of illumination devices varies in at least one of intensity, color or frequency over time based on said measured variable electrical quantity.*

Borden discloses this limitation. (See Claim [8] above; EX1003, ¶¶ 277, 288, 322.)

**X. GROUND 5: CLAIMS 9-10, 12-14  
ARE ANTICIPATED BY ERICKSON**

**A. Erickson**

Erickson (EX1014) is prior art under at least 35 U.S.C. § 102(e) (pre-AIA) as its U.S. patent application (EX1015) was filed October 2, 2003, about 29 months before the PCT application date of the '829 patent. Erickson discloses a cable that detects data traffic signals and provides a visual indication of these signals. (EX1014, 1:30-44.) The cable in Erickson is a communication cable, like a USB, FireWire, COM, LPT, or SCSI cable that carries video, audio, or other data signals. (*Id.*, 3:2-5, 3:16-18, 4:20-23.) For example, Erickson Fig. 1 illustrates cable 106 extending between computer 102 and peripheral device 104. (*Id.*, 2:66-3:2.)

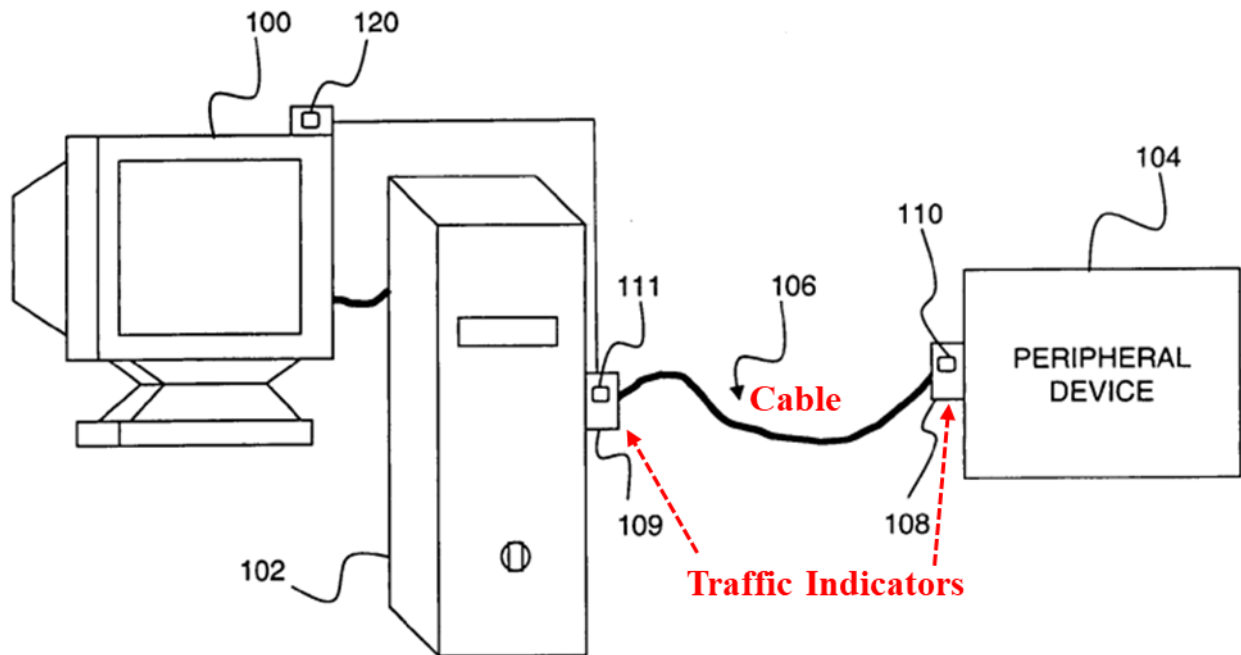
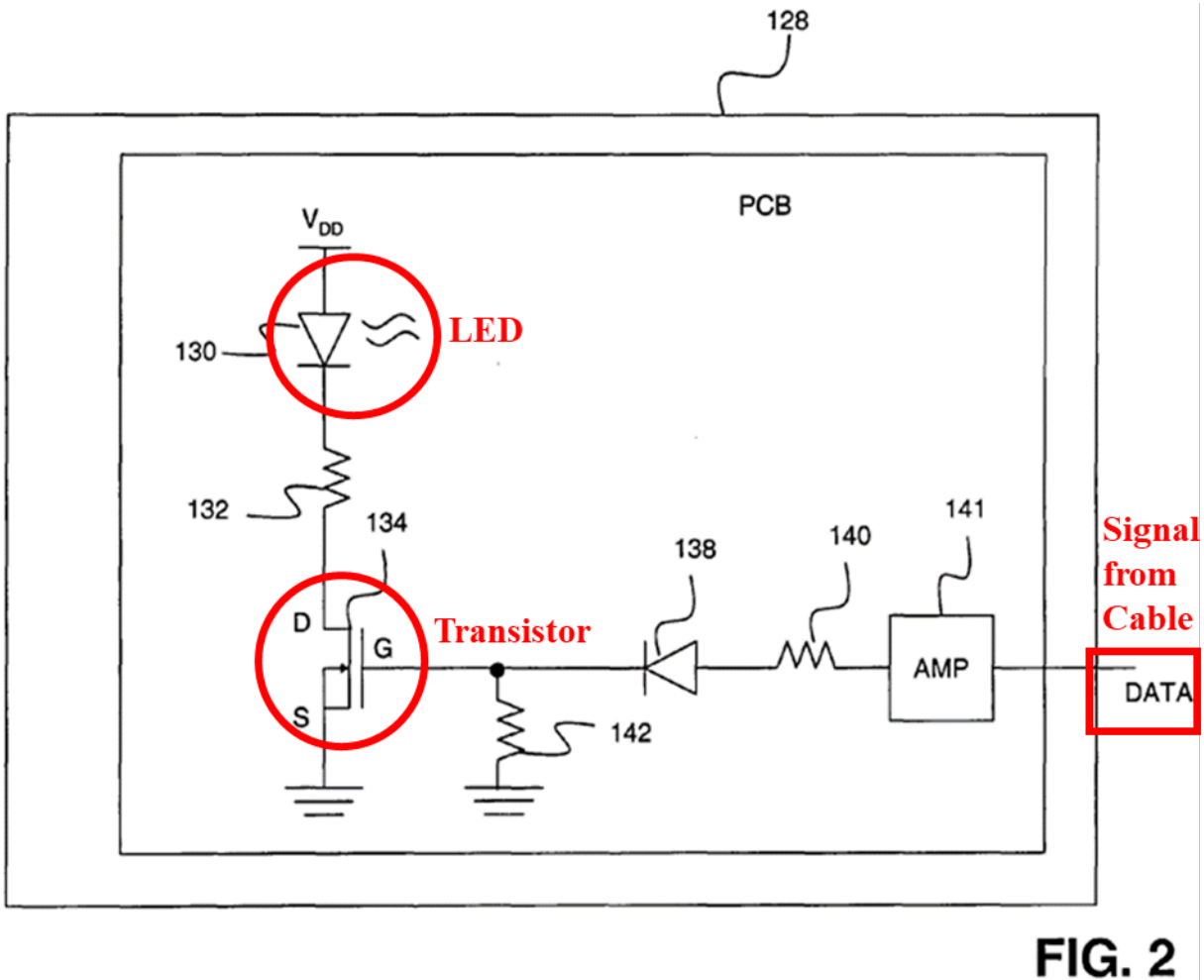


**FIG. 1**

EX1014, Fig. 1 (annotated)

(EX1003, ¶ 329) Fig. 1 illustrates traffic indicators 110 and 111 illuminated by one or more LEDs (EX1014, 3:20-24, 3:49-51) but Erickson also discloses translucent wire coverings that disperse light to appear as though they are conducting the light. (*Id.*, 3:43-46; *see* EX1003, ¶ 142.) Erickson discloses monitoring data signals through at least one of the wires of the cable and that traffic indicators generate a visual indication (*e.g.*, light flashing) in response to detected signals. (EX1014, 1:33-38, 3:14-16, 3:54-58; *see* EX1003, ¶ 140.) As discussed with respect to Jablonski (Grounds 1-2, *supra*), a data signal is the transmission of as current, voltage, and power. (*See* EX1003, ¶¶ 52, 55-58.)

Erickson discloses detection circuitry that senses a data signal on a wire, and driver circuitry that switches a transistor drive circuit to feed current according to this signal and illuminate traffic indicators to provide a visual indication of measured data traffic. (EX1014, 1:38-44, 4:1-7, 4:30-33.)



EX1014, Fig. 2 (annotated)

Fig. 2 illustrates transistor 134 in series with LED 130 (*id.*, 4:24-29), which detects signals in a data cable through amplifier 141. (*Id.*, 4:30-43; EX1003, ¶ 332.) Transistor 134 conducts and interrupts current according to the data signal on the

cable. (*Id.*, 4:44-58; EX1003, ¶ 78-80 140; *see also* ¶¶ 132, 276.) LED 130 turns on when current flows through transistor 134 and off when current is interrupted such that it flashes according to data signals through the cable (EX1014, 4:44-58), illuminating the traffic indicator to provide a visual indication of these signals. (*Id.*, 3:14-19, 4:8-12.)

## **B. Detailed Mapping Of Erickson To Claims**

### **1. Claim 9**

[9.a] *A cord comprises at least one electric wire and a substantially wire shaped illuminator at least partly arranged along an extension of said at least one electric wire,*

Erickson discloses this element. Erickson discloses a cable including one or more wires, and traffic indicators that include translucent wire coverings that disperse and appear to conduct light. (*Id.*, 1:32-38, 3:43-46; *see* EX1003, ¶ 333.)

[9.b] *said substantially wire shaped illuminator having means for illumination when energized to indicate an electrical quantity, being one or several of power, current or voltage through the at least one electric wire,*

Erickson discloses this element. Erickson discloses traffic indicators illuminated by one or more LEDs that are driven by a transistor to provide a visual indication (*i.e.*, flashing) of video, audio, or data signals detected in at least one wire of a cable. (*Id.*, 3:14-30, 3:54-58.) A POSITA would recognize that video, audio,

and data signals are transmitted as current and voltage. (See EX1003, ¶¶ 52, 55-57, 334.)

[9.c] wherein said substantially wire shaped illuminator indicates the current or voltage through said at least one electric wire when at least one illumination characteristic of said substantially wire shaped illuminator is controlled with respect to said electrical quantity by feeding the substantially wire shaped illuminator with varying current or voltage corresponding to the current or voltage through at least one electrical wire.

Erickson discloses this element. Erickson discloses detection circuitry that senses signals on a wire carrying data through a cable and a transistor drive circuit that conducts (*i.e.*, feeds) current through an LED to indicate the detected signal by flashing on and off. (EX1014, 1:32-44, 4:30-34, 4:44-55.) The data rate of signals through the cable is indicated by the rate of flashing. (*Id.*, 3:24-26, 4:52-55.) The LED illuminates a traffic indicator, including a translucent wire covering that disperses and appears to conduct light. (*Id.*, 3:43-48, 4:8-12; *see* EX1003, ¶ 335.)

## 2. Claim 10

The cord of claim 9, further comprising a substantially translucent coating, covering said at least one electric wire and substantially wire shaped illuminator.

Erickson discloses this limitation. (See Claims [9.a], [9.c] above; EX1003, ¶¶ 333, 335, 336.)

## 3. Claim 12

The cord of claim 9, wherein said substantially wire shaped illuminator is an optical fiber.

Erickson discloses this limitation. Erickson discloses a translucent wire covering that disperses light to appear as though it is conducting the light. (*Id.*, 3:43-46.) This translucent wire covering is an example of optical fiber. (EX1003, ¶¶ 85, 87, 142, 337.) (*See* Borden-Currie Claim [4] (§ VIII.E.3) above)

**4. Claim 13**

*The cord of claim 9, wherein said substantially wire shaped illuminator indicates current or power through said at least one electric wire.*

Erickson discloses this limitation. Erickson discloses detection circuitry that monitors data signals, including audio and video signals, through a wire and indicates these signals with traffic indicators, including translucent wire coverings. (*Id.*, 1:32-44, 3:14-19, 3:43-48, 3:54-58, 4:30-22.) (*See* Claim [9.c] above.) A POSITA would recognize that data, video, and audio signals are each transmitted as current. (*See* EX1003, ¶¶ 52, 55-57, 338.)

**5. Claim 14**

*[14.a] A method of visually indicating an electrical quantity, being one or several of power, current or voltage through a conductor, the method comprising the steps of:*

Erickson discloses this element. (*See* Claims [9.b], [9.c] above; EX1003, ¶¶ 334-335, 339.)

[14.b] *energizing a substantially wire shaped illuminator and controlling at least one illumination characteristic of said substantially wire shaped illuminator with respect to said electrical quantity by measuring the electrical quantity and*

Erickson discloses this element. (See Claims [9.b], [9.c] above; EX1003, ¶¶ 334-335, 340.)

[14.c] *feeding the substantially wire shaped illuminator with varying current or voltage corresponding to the current or voltage through the conductor.*

Erickson discloses this element. (See Claim [9.c] above; EX1003, ¶¶ 335, 339.)

## **XI. NO OBJECTIVE INDICIA OF NON-OBVIOUSNESS**

A product called the “Power-Aware Cord” received some recognition including Time Magazine’s “The 50 Best Inventions of 2010” (EX1025). Patent Owner may allege that this product was an embodiment of at least some of the Challenged Claims, has been copied, and was commercially successful in some markets for some period of time. But Patent Owner will be unable to tie these alleged objective criteria to the claimed subject matter.

First, Patent Owner cannot show that any objective indicia are attributable to any claimed improvement over the Jablonski designs. *Cf. Novartis AG v. Torrent Pharm. Ltd.*, 853 F.3d 1316, 1331 (Fed. Cir. 2017) (affirming PTAB obviousness decision: “In evaluating whether the requisite nexus exists, the identified objective indicia must be directed to what was not known in the prior art—including patents

and publications—which may well be the novel combination or arrangement of known individual elements.”).

The only arguable difference between the ’829 patent’s claims and Jablonski depends on an improperly narrow construction of “current” to limit it to currents through cables powering devices. This distinction is insignificant because measuring and indicating currents is functionally equivalent whether or not that current embeds signals. Indeed, Jablonski discloses measuring current through the wire(s) of a cable, sending these measured levels of current to a controller, programming the controller to output control signals proportional to that measured current level, using those control signals to control and modulate the intensity and/or frequency of current sent to one or more LEDs coupled to one or more linear lighting elements (*e.g.*, optical light guides or electroluminescent wires), extending the lighting elements(s) along the cable, and thereby indicating the measured level of current in the wire by varying the illumination along the cable. *See* Section VII.A, *supra*. Jablonski discloses even controlling the illumination to “simulate a light running the length of the line.” (EX1005, 20:12-14.) Patent Owner cannot show that any objective indicia are due to indicating current that conveys power, as opposed to all of the claimed features that Jablonski discloses.

Second, there is no nexus because the claims do not require the most noticeable feature of the product, highlighted in the Time magazine abstract: “The

more current, the brighter and faster the blue light spirals.” (EX1025.) The claims do not require a spiraling light, or that the light be blue, or that the light flashes faster to indicate more current, or that the light shines more brightly as the current increases.

Third, there is no evidence of objective indicia commensurate with the claimed combinations’ requirements that the combination include a “substantially wire shaped illuminator” or, in some claims, “a plurality of illumination devices.” There is no evidence that the product would have received less praise or success had it used, for example, a single tape lighting element wrapped around the cable.

Fourth, this is not a case where a technological field with the necessary pieces of prior art languished for years before an inventor made a claimed combination that received accolades, *etc.* The ’829 patent asserts priority to a March 2005 Swedish application. None of the asserted prior art references was public in March 2005. Thus, the logic behind crediting such indicia as evidence of non-obviousness, is missing here.

Further, even if Patent Owner could show both objective indicia and a nexus to the claims, that would not overcome the strong prior art showing herein.

## **XII. NO DISCRETIONARY GROUNDS FOR DENIAL**

### **A. 325(d)**

Neither “the same [n]or substantially the same prior art or arguments previously were presented to the Office.” 35 U.S.C. § 325(d).

Four of the five asserted prior art references (Exs. 1005, 1009, 1012, 1014) were neither cited nor discussed during prosecution, nor referenced in the '829 patent. These uncited prior art references disclose material features not asserted by the Examiner or acknowledged by the applicants in the prosecution history to be prior art, including: (1) modulating the illumination of a linear lighting element along a cable according to the level of a current signal measured in the cable (Jablonski), (2) regulating illuminated traffic indicators according to the data signals transmitted through the cable (Erickson), (3) illuminating the length of a cable by plugging it into a power strip having an LED light exposed at the socket for the cable's plug (Currie), and (4) a power strip measuring current and sending proportional signals to LEDs (Borden). The Examiner did not consider these prior art features. (See EX1002.)

The fifth reference, Godard (EX1007), was identified during prosecution but was not applied against the claims (EX1002), nor discussed by the applicants. Nothing in the prosecution suggests that the Examiner considered Godard in combination with Jablonski or any equivalent prior art disclosure. *Cf. Microsoft*

*Corp. v. Parallel Networks Licensing, LLC*, IPR2015-00486, Paper 10, 2015 WL 4760578, at \*8 (July 15, 2015) (rejecting argument that institution be denied under Section 325(d), because, though listed on an IDS, “the references were not applied against the claims and there is no evidence that the Examiner considered the particular disclosures cited by ... the Petition”); *Intex Recr. Corp. v. Team Worldwide Corp.*, IPR2018-00871, Paper 14 at 13 (Sept. 14, 2018) (references initialed in an IDS, but not discussed or used as basis for rejections, received only “[c]ursory consideration ... [that] weighs against exercising discretion to deny under § 325(d)”).

Because these key teachings in the prior art were not previously considered by the Office, this petition should not be denied under Section 325(d).

**B. Fintiv**

Institution is appropriate under 35 U.S.C. § 314 (a) because this petition presents a “compelling, meritorious challenge[]” and does not raise inefficiency or gamesmanship concerns. See *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (Mar. 20, 2020); *Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation* (June 21, 2022) (“Interim

Procedure”).<sup>4</sup> Of the six *Fintiv* factors, the Interim Procedure emphasizes a petition’s merits (factor 6) and avoidance of inconsistent outcomes (factor 4). *Interim Procedure* at 4-5.

Under *Fintiv* factor 6, the Board should “not deny institution” because the “petition presents compelling evidence of unpatentability” in view of Grounds 1-5. *Id.* at 4-5, 9.

*Fintiv* factor 4 also weighs in favor of institution because Petitioner stipulates that, should this *inter partes* review be instituted, Petitioner will not pursue in district court litigation any prior art invalidity defense that is the same as any instituted ground of unpatentability. *Sand Revolution II, LLC v. Continental Intermodal Group—Trucking LLC*, IPR2019-01393, Paper 24 at 11–12 (June 16, 2020) (informative). The Board has routinely found that similar stipulations weigh against discretionary denial. *E.g.*, *Siemens Industry Software Inc. v. Synopsys Inc.*, IPR2021-01212, Paper 11 at 16-17 (Jan. 13, 2022); *Apple Inc. v. Seven Networks, LLC*, IPR2020-00180, Paper 12 at 15-16 (Aug. 14, 2020). Further, four of the Petition’s five references (Godard, Borden, Currie, and Erickson) have not been asserted in the

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<sup>4</sup> Available at

[https://www.uspto.gov/sites/default/files/documents/interim\\_proc\\_discretionary\\_denials\\_aia\\_parallel\\_district\\_court\\_litigation\\_memo\\_20220621\\_.pdf](https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf)

district court. Therefore, the asserted unpatentability grounds will exceed the scope of any district court invalidity determination.

*Fintiv* factor 3 (investment by the court and the parties) weighs in favor of institution because the district court has merely held a scheduling conference and has not substantively engaged with the case, Patent Owner's investment does not exceed a cursory complaint and basic disclosures, and the case is in early discovery and the claim construction procedure has only just begun.

*Fintiv* factor 1 (likelihood of stay) is neutral. *Hulu, LLC, v. SITO Mobile R&D, LLC*, IPR2021-00298, Paper 11 at 11 (May 19, 2021) (declining to infer how a district court would rule on the hypothetical request for a stay).

Finally, while *Fintiv* factor 2 (scheduled trial date) might marginally weigh against institution, it is far outweighed by the other *Fintiv* factors that favor institution. Even if the estimated trial date falls before the date of a final written decision, that trial date could change, and any trial would not resolve the unpatentability issues presented in this petition.

On balance, *Fintiv* factor 6 (the merits), factor 4 (lack of overlap), and factor 3 (limited investment) all weigh heavily against discretionary denial, and the Board should institute IPR.

### **XIII. CONCLUSION**

Petitioners request institution for all claims and grounds.

Respectfully submitted,

Dated: December 22, 2022

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**CERTIFICATE OF COMPLIANCE WITH  
TYPE-VOLUME LIMITATION PURSUANT TO 37 C.F.R. § 42.24**

This brief complies with the type-volume limitation of 37 C.F.R. § 42.24(a)(1)(i).

The brief contains 13,785 words, excluding the parts of the brief exempted by 37 C.F.R. § 42.24(a).

The brief has been prepared in a proportionally spaced typeface using Microsoft Word 2013 in a 14-point Times New Roman font.

Dated: December 22, 2022

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**CERTIFICATE OF SERVICE**  
**IN COMPLIANCE WITH 37 C.F.R. § 42.6(E)(4)**

The undersigned certifies that the **Petition for *Inter Partes* Review of U.S. Patent No. 8,791,829 and Exhibits 1001-1027** were served on December 22, 2022, via **Express Mail** on Patent Owner at the following address of record as listed on the USPTO Patent Center:

Patent Portfolio Builders, PLLC  
754 Warrenton Road, Suite 113-314  
Fredericksburg, VA 22406

Dated: December 22, 2022

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