UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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**LUMENIS BE LTD.,**
Petitioner,

v.

**BTL HEALTHCARE TECHNOLOGIES A.S.,**
Patent Owner.

_____

Case IPR2021-01405
Patent No. 10,124,187

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# PETITION FOR *INTER PARTES* REVIEW

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## LIST OF EXHIBITS

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| 1003 | Prosecution history of U.S. Application No. 15/151,012, which led to the issuance of the '187 (excerpts) |
| 1004 | U.S. Patent Application Publication No. 2015/0165226 ("Simon") |
| 1005 | U.S. Patent Application Publication No. 2014/0148870 ("Burnett-'870") |
| 1006 | Chris Hovey et al., *The Guide To Magnetic Stimulation*, Magstim, July 21, 2006, Affidavit ("Magstim")[1] |
| 1007 | U.S. Patent Application Publication No. US20050216062 ("Herbst") |
| 1008 | U.S. Pat. No. 7,396,326 ("Ghiron") |
| 1009 | U.S. Pat. No. 10,675,819 ("Li") |
| 1010 | U.S. Pat. Pub. No. 2014/0277219A1 ("Nanda") |
| 1011 | Alain-Yvan Belanger, *Therapeutic Electrophysical Agents*, 3d Edition, Wolters Kluwer (2015), Declaration ("Belanger") |
| 1012 | *Reserved* |
| 1013 | U.S. Patent Application Publication No. 2010/0168501 from Application No. 12/508,529 ("Burnett-'529") |

[1] All pinpoint citations to Magstim, throughout this document and the corresponding expert declaration, refer to the page number originally in Magstim itself (*i.e.*, in the bottom middle portion of Magstim).

| Exhibit (Ex-) | Description |
|---|---|
| 1014 | Gorgey et al., *Effects of Electrical Stimulation Parameters on Fatigue in Skeletal Muscle*, J. Orthop. & Sports Phys. Therapy Vol. 39: 9 (2009) ("Gorgey") |
| 1015 | Stevens et al., *Neuromuscular Electrical Stimulation for Quadriceps Muscle Strengthening After Bilateral Total Knee Arthroplasty: A Case Series*, Journal of Orthopaedic & Sports Physical Therapy, 34(1):21-29 (2004) ("Stevens") |
| 1016 | Doucet et al., *Neuromuscular Electrical Stimulation for Skeletal Muscle Function*, Yale Journal of Biology & Medicine 85:201-215 (2012) ("Doucet") |
| 1017 | Abulhasan et al., *Peripheral Electrical and Magnetic Stimulation to Augment Resistance Training*, Journal of Functional Morphology and Kinesiology, 1(3):328-342 (2016) ("Abulhasan") |
| 1018 | Remed, Salus Talent Brochure (2010) ("Salus") |
| 1019 | Iskra Medical, TESLA Stym Website (2013) ("TESLA Stym") |
| 1020 | 510(k) Summary, No. K163165, AM-100 (2017) ("AM-100") |
| 1021 | 510(k) Summary, No. K160992, HPM-6000 (2016) ("HPM-6000") |
| 1022 | U.S. Pat. Pub. No. 2003/0158585 ("Burnett '585") |
| 1023 | U.S. Provisional Patent Application Ser. No. 60/848,720 ("Burnett-Provisional-'720") |
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| 1025 | U.S. Pat. Pub. No. 2008/0306325 ("Burnett-'325") |
| 1026 | U.S. Pat. No. 6,155,966 ( "Parker") |
| 1027 | U.S. Pat. No. 5,344,384 ("Ostrow") |
| 1028 | Andrey Gennadievich Belyaev, *Effect of Magnetic Stimulation on the Strength Capacity of Skeletal Muscle* (2015) (Ph.D. dissertation, |

| Exhibit (Ex-) | Description |
|---|---|
| | Federal State Budgetary Educational Institution of Higher Professional Education "Velikiye Luki State Academy of Physical Culture and Sport") (English translation) ("Belyaev") |
| 1029 | Andrey Gennadievich Belyaev, *Effect of Magnetic Stimulation on the Strength Capacity of Skeletal Muscle* (2015) (Ph.D. dissertation, Federal State Budgetary Educational Institution of Higher Professional Education "Velikiye Luki State Academy of Physical Culture and Sport") (Russian) |
| 1030 | U.S. Pat. No. 7,024,239 ("George") |
| 1031 | U.S. Pat. No. 5,181,902 ("Erickson") |
| 1032 | U.S. Pat. Pub. No. 2006/0199992 ("Eisenberg") |
| 1033 | U.S. Pat. No. 5,718,662 ("Jalinous") |
| 1034 | U.S. Pat. No. 5,061,234 ("Chaney") |
| 1035 | U.S. Pat. No. 10,271,900 ("Marchitto-'900") |
| 1036 | U.S. Pat. Pub. No. 2016/0184601 ("Gleich") |
| 1037 | Judith Woehrle et al., *Dry Needling and its Use in Health Care – A Treatment Modality and Adjunct for Pain Management*, J. Pain & Relief, 4(5):1-3 (2015) ("Woehrle") |
| 1038 | U.S. Patent Publication No. 2015/0157873 ("Sokolowski") |
| 1039 | U.S. Patent No. 7,744,523 ("Epstein") |
| 1040 | U.S. Pat. No. 6,738,667 ("Deno") |
| 1041 | U.S. Pat. No. 6,871,099 ("Whitehurst") |
| 1042 | U.S. Patent Application Publication No. US20050075701 ("Shafer-'701") |

| Exhibit (Ex-) | Description |
|---|---|
| 1043 | U.S. Patent Application Publication No. US20050075702 ("Shafer-'702") |
| 1044 | D. Suarez-Bagnasco et al., *The Excitation Functional for Magnetic Stimulation of Fibers*, 32nd Ann. Int'l Conf. of the IEEE EMBS, 4829–33 (2010) ("Suarez-Bagnasco") |
| 1045 | Zhi-De Deng et al., *Electric field depth-focality tradeoff in transcranial magnetic stimulation: simulation comparison of 50 coil designs*, Brain Stimulation, 6(1):1-13 (2013) ("Zhi-De-Deng-Electric") |
| 1046 | Zhi-De Deng, *Electromagnetic Field Modeling of Transcranial Electric and Magnetic Stimulation: Targeting, Individualization, and Safety of Convulsive and Subconvulsive Applications*, (2013) (Ph.D. dissertation, Columbia University) ("Zhi-De-Deng-Electromagnetic") |
| 1047 | U.S. Patent Application Publication No. 2011/0190569 ("Simon-'569") |
| 1048 | U.S. Patent Application Publication No. 2011/0152967 ("Simon-'967") |
| 1049 | U.S. Patent Application Publication No. 2011/0125203 ("Simon-'203") |
| 1050 | U.S. Patent Application Publication No. 2011/0046432 ("Simon-'432") |
| 1051 | U.S. Patent No. 9,089,719 ("Simon-'719") |
| 1052 | U.S. Patent No. 9,037,247 ("Simon-'247") |
| 1053 | U.S. Patent No. 8,868,177 ("Simon-'177") |
| 1054 | File History of U.S. Patent Application No. 12/859,568 (excerpts) ("File-history-'568") |

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|---|---|
| 1055 | File History of U.S. Patent Application No. 12/964,050 (excerpts) ("File-history-'050") |
| 1056 | File History of U.S. Patent Application No. 13/005,005 (excerpts) ("File-history-'005") |
| 1057 | File History of U.S. Patent Application No. 13/024,727 (excerpts) ("File-history-'727") |
| 1058 | *Reserved* |
| 1059 | *Reserved* |
| 1060 | *Reserved* |
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| 1062 | *Reserved* |
| 1063 | U.S. Patent Application Publication No. 2011/0172735 ("Johari") |
| 1064 | U.S. Patent Application Publication No. 2013/0123765 ("Zarsky") |
| 1065 | *Reserved* |
| 1066 | U.S. Patent Application Publication No. 2020/0155221 ("Marchitto-'221") |
| 1067 | *Reserved* |
| 1068 | *Reserved* |
| 1069 | U.S. Patent Application Publication No. 2016/0129274 ("Park") |
| 1070 | U.S. Patent Application Publication No. 2001/0031906 ("Ishikawa") |
| 1071 | U.S. Patent No. 5,766,124 ("Polson") |
| 1072 | *Reserved* |

| Exhibit (Ex-) | Description |
|---|---|
| 1073 | U.S. Patent Application Publication No. 2009/0284339 ("Choi") |
| 1074 | Javier Ruiz-Esparza & Julio Barba Gomez, *The Medical Face Lift: A Noninvasive, Nonsurgical Approach to Tissue Tightening in Facial Skin Using Nonablative Radiofrequency*, Dermatol Surg 29:325-332 (2003) ("Ruiz-Esparza") |
| 1075 | Nils Krueger et al., *Safety and Efficacy of a New Device Combining Radiofrequency and Low-Frequency Pulsed Electromagnetic Fields for the Treatment of Facial Rhytides*, J Drugs Dematol. 11(11):1306-1309 (2012) ("Krueger") |
| 1076 | U.S. Patent No. 10,195,454 ("Yamashiro") |
| 1077 | Venus Concept Ltd., Venus Freeze MP$^2$ User Manual International (2012) ("Venus Freeze") |
| 1078 | European Patent EP 2069014 B1 ("Hancock") |
| 1079 | U.S. Patent No. 8,204,446 ("Scheer") |
| 1080 | Agilent 33500 Series 30 MHz Function / Arbitrary Waveform Generator User's Guide ("Agilent") |
| 1081 | Jim Turley, *Agilent Technologies Announces 30 MHz Function/Arbitrary Waveform Generators with Unparalleled Signal Accuracy*, Elec. Eng'g J. (Aug. 4, 2010), https://www.eejournal.com/article/20100804-03/ ("Turley") |
| 1082 | *Agilent Announces 30 MHz Function/Arbitrary Waveform Generators*, Microwave J. (Aug. 3, 2010), https://www.microwavejournal.com/articles/9851-agilent-announces-30-mhz-function-arbitrary-waveform-generators ("Microwave") |
| 1083 | Declaration of Jonathan Bradford |

# I. INTRODUCTION

Lumenis Be Ltd. ("Petitioner") respectfully requests IPR of Claims 18-30 ("Claims") of U.S. 10,124,187 ("'187") pursuant to §§311-319 and §42.100.

'187 is directed to treating a patient using a combination of a time-varying magnetic field and radiofrequency (RF) waves, to provide an "aesthetic" improvement to a patient's "skin" and other "tissue." '187, *Abstract*, 1:64–2:8. '187 describes a combined device for applying radiofrequency treatment and a time-varying magnetic field to a patient. Bikson, ¶¶40-42, 102-108.

Figure 6 shows the RF treatment device (116), including a high-frequency (HF) generator (111) receiving power from a power supply (110) and generating radiofrequency waves, for delivery to a radiofrequency electrode (6). '187, Fig. 6, 7:34–39, 7:58–62, 8:29–31, 8:62–64.

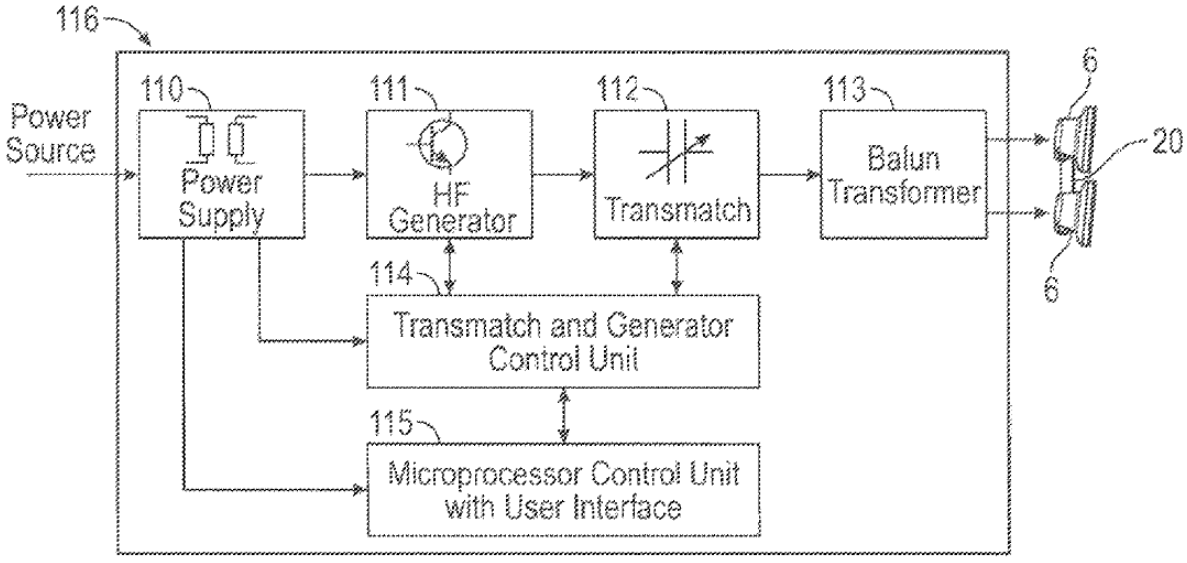


FIG. 6

The radiofrequency waves heat the target structure, to "remove[] and/or remodel[] adipose tissue," "collagen tissue," and "elastic fibers" in the treated area. '187, *Abstract*, 2:4–8, 13:2–5. Bikson, ¶103.

Figure 4A shows the magnetic field generating device, including an energy storage device (20) (*i.e.*, a capacitor) receiving energy from an energy source (23), and connected to a coil (21) through a switching device (22).

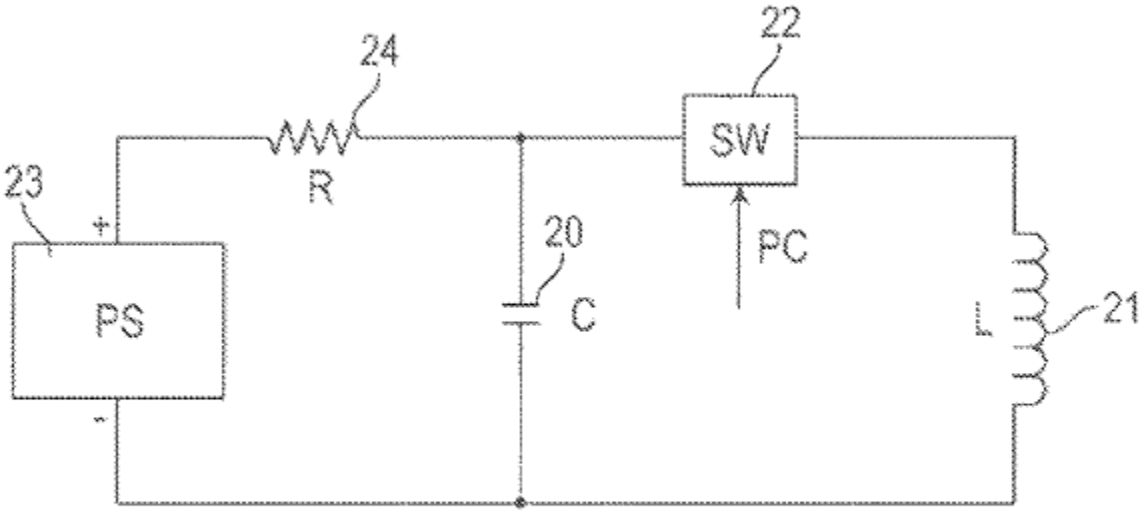


FIG. 4A

'187, Fig. 4A, '187, 6:11–18. Energy from the storage device flows through the coil, generating the magnetic field applied to the patient. '187, 6:15–18. Bikson, ¶104.

'187 explains that various types of "non-invasive aesthetic" treatment

methods were known and in use, including "radiofrequency treatment." '187, 1:39–43. However, '187's purposed novelty is a "method of treating a biological structure [that] uses a combination of non-invasive methods." '187, 1:66–67. Bikson, ¶¶102-108.

But the combination of magnetic stimulation and heat treatment using radiofrequency was well-known and the claimed features of magnetic or radiofrequency treatment or devices were merely conventional. Bikson, ¶¶43-101.

**Edoute** discloses a device for applying RF and magnetic field simultaneously to target body region for complementary effect resulting from simultaneous heat (RF) and electromagnetic stimulation on muscles. Edoute, *Abstract*, [0200]. Bikson, ¶¶126-128, 216. **Park** discloses treating a patient with a combination of pulsed electromagnetic field and heat energy such as RF for "firming muscles." Park, [0004], [0036]. Bikson, ¶¶245-247, 347. **Zarsky** discloses circuit components to generate RF for treating tissues. Zarsky, *Abstract*, Fig. 1. Bikson, ¶¶129-130.

## II. MANDATORY NOTICES UNDER 37 C.F.R. §42.8

### A. Real Party-in-Interest

Lumenis Be Ltd. is the real party-in-interest. No other party had access to or control over the present Petition, and no other party funded or participated in preparation of the present Petition.

### B. Related Matters

Petitioner is concurrently filing another petition (IPR2021-01404) challenging claims 1, 19-30 of the '187 patent. Due to word-count constraints and the large number of claims, requiring 13,343 words in IPR2021-01404 and 13,925 words in IPR2021-01405, claims 2-18 are presented separately herein. *See* PTAB Consolidated Trial Practice Guide, November 2019, 59-61 (permitting parallel petitions in certain circumstances, such as a large number of claims).

The '187 patent is not the subject of any other litigation.

### C. Lead and Back-Up Counsel

| Lead Counsel | Backup Counsel |
|---|---|
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Petitioner consents to electronic service of documents to the email addresses

of the counsel identified above.

## III. PAYMENT OF FEES

The undersigned authorizes the Office to charge the fee required by §42.15(a) for this Petition for review to Deposit Account No. 18-1945, under Order No. 116610-0005-651. Any additional fees that might be due are also authorized.

## IV. REQUIREMENTS FOR *INTER PARTES* REVIEW

### A. Grounds for Standing

Pursuant to §42.104(a), Petitioner certifies '187 is available for IPR. Petitioner is not barred or estopped from requesting IPR challenging the Claims on the grounds herein.

### B. Identification of Challenge

Pursuant to §§42.104(b), Petitioner requests the Board cancel the Claims as unpatentable.[2]

#### 1. Specific Art on Which the Challenge is Based

| Name | Exhibit | Filed | Published | Prior art |
|---|---|---|---|---|
| **Simon** | 1004 | 3/3/2015 | 6/18/2015 | §102(a)(1)-(2) |
| **Edoute** | 1061 | 9/18/2014 | 1/22/2015 | §102(a)(1)-(2) |
| **Burnett-'870** | 1005 | 11/20/2013 | 5/29/2014 | §102(a)(1)-(2) |
| **Zarsky** | 1064 | 11/16/2011 | 5/16/2013 | §102(a)(1)-(2) |

[2] The art predates '187's earliest priority date; Petitioner takes no position as to the priority claims.

| Name | Exhibit | Filed | Published | Prior art |
|---|---|---|---|---|
| **Park** | 1069 | 11/10/2014 | 5/12/2016 | §102(a)(2) |
| **Ishikawa** | 1070 | 4/13/2001 | 10/18/2001 | §102(a)(1)-(2) |

### 2. Statutory Grounds on Which the Challenge is based

| Ground | Statute | Claim(s) | Prior Art |
|---|---|---|---|
| 1 | §103 | 2-9, 11, 14 | Simon in view of Edoute, Zarsky, and Ishikawa |
| 2 | §103 | 10, 12-13, 15-18 | Simon in view of Edoute and Zarsky |
| 3 | §103 | 2-9, 11, 14 | Simon in view of Edoute, Park, Zarsky, and Ishikawa |
| 4 | §103 | 10, 12-13, 15-18 | Simon in view of Edoute, Park, and Zarsky |
| 5 | §103 | 2-18 | Burnett-'870 in view of Park and Zarsky |

*See* §VIII.

## V. BACKGROUND

### A. '187 Patent

'187 is directed to patient treatment using a combination of a time-varying magnetic field and radiofrequency waves, to provide an "aesthetic" improvement to a patient's "skin" and other "tissue." '187, *Abstract*, 1:64–2:8. Bikson, ¶102. '187 recognizes that "radiofrequency treatment" was one of the "most common methods used for non-invasive aesthetic applications" and its effect is

known to be "based specifically on heat production in the biological structure." '187, 1:39-47.

'187 discloses a treatment device for applying radiofrequency (RF) treatment to a patient. '187, Fig. 6.

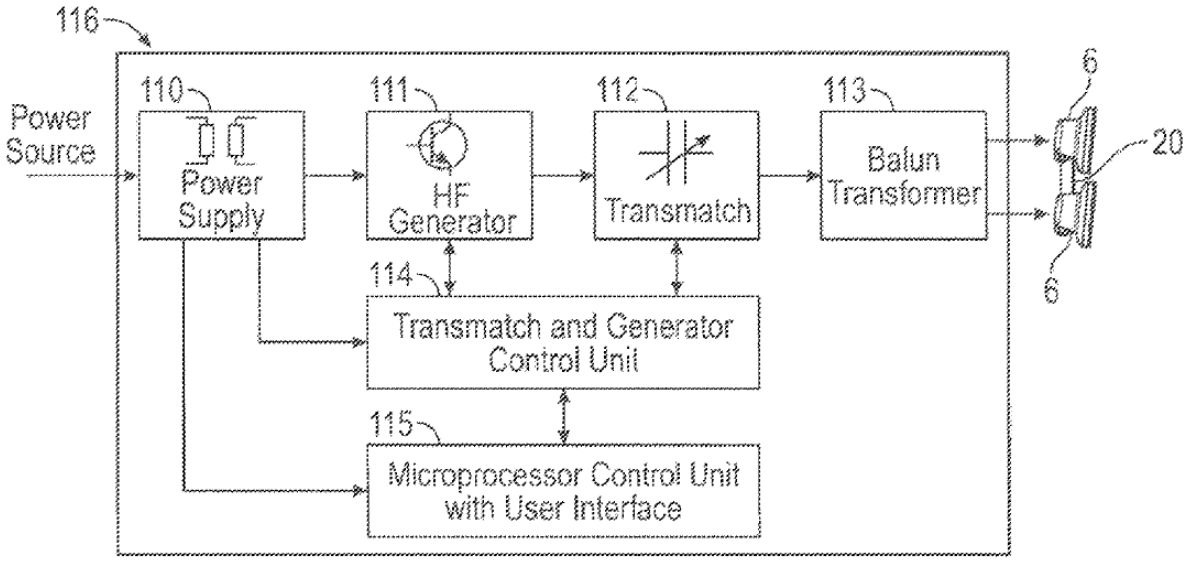



FIG. 6

Treatment device (116) receives power from a power supply (110), which provides power to a high-frequency (HF) generator (111) generating radiofrequency waves delivered to a radiofrequency electrode (6). '187, 7:34–39, 7:58–62, 8:29–31, 8:62–64. The radiofrequency waves heat a target structure of the patient, "remov[ing] and/or remodel[ing] adipose tissue," "collagen tissue," and "elastic fibers." '187, *Abstract*, 2:4–8, 13:2–5. Bikson, ¶103.

'187 also discloses magnetic field treatment of the patient's target body structure. Figure 4A shows a circuit including an energy storage device (20) (*i.e.*,

a capacitor) electrically connected to an energy source (23), a switching device (22), and a coil (21).

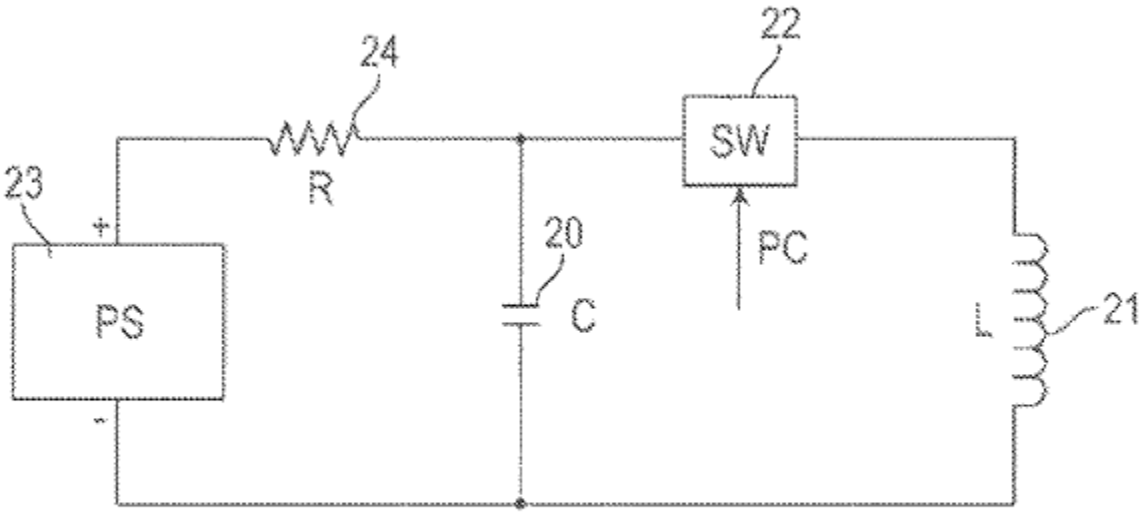



FIG. 4A

'187, Fig. 4A, '187, 6:11–18. The energy storage device is charged from the energy source, and energy from the energy storage device is provided through the switching device to the coil, and produces a magnetic field. '187, 6:15–18. The magnetic field may be a time-varying magnetic field with various repetition rates, impulse durations, and magnetic flux densities. '187, 16:6–17. Bikson, ¶¶104-107.

The device includes a "control unit" to regulate the magnetic field and radiofrequency generations, and uses a "casing" with a "cooling media" for the applicators. '187, 5:25-52, 5:65-6:2, 7:39-56. Bikson, ¶108.

**B. Prosecution History**

'187 issued from U.S. Application No. 15/151,012, filed 5/10/2016. Ex-1003, 1–36. Track 1, prioritized status was granted 6/3/2016. Ex-1003, 41–43. Bikson, ¶109.

There were three prior-art based rejections. In response to the first rejection (12/1/2016) over certain prior art, Applicant canceled original claims 1–30 and added new claims 31–60. Ex-1003, 51–62, 69–79. Likewise, for the second rejection (6/22/2017) over certain prior art, Applicant filed an RCE with an amendment canceling claims 31–60 and adding new claims 61–90. Ex-1003, 91–106, 137–88. Bikson, ¶110.

The third rejection (12/22/2017) was based on obviousness over Edoute-'727 (US8,979,727) in view of Rohwedder (US2006/0152301) alone or with **Ishikawa**.[3] Ex-1003, 320–29. The Examiner, in rejecting independent claim 70, simply stated "Edoute teaches a method as claimed but does not teach an energy storage device to be used in the method," and Rohwedder teaches the

[3] **Ishikawa** was cited for the proposition that the use of litz wires and the claimed wire diameter was known; and this proposition was never disputed or overcome by the applicant.

"energy storage device." Ex-1003, 324. The Examiner found various claims to be allowable for the reasons summarized in the table below. Ex-1003, 327; Bikson, ¶111.

Rather than directly addressing the obviousness rejection, Applicant again filed an amendment cancelling claims 61–90, and adding new claims 91–120. Ex-1003, 335–44. Applicant provided a chart with the amendments that purportedly showed how previous claims correspond to claims 91-120. Ex-1003, 342. According to Applicant, since claim 100 (became the issued claim 10) includes allowable subject matter from claim 74 (a transmatch), it was thus clear of the art. Ex-1003, 343. After Examiner finally rejected the claims for lacking written description (5/17/2018), and Appellant made minor amendments to the claims (7/11/2018), the Examiner allowed the claims (8/6/2018). Ex-1003, 350–354, 365–372, 381–385; Bikson, ¶112.

The table below summarizes the purported correspondence between issued independent claims and the various sets of pending claims and the reasons for allowance. *See* Ex-1003, 170-171, 327, 342-343 ("claim 109 includes original Claims 79 and 89"). Bikson, ¶113.

| Issued Claims | Pending Claims | Prior Pending Claims | Reasons for Allowance: Prior Art does not teach |
|---|---|---|---|
| 1 | 91 | 61 | Voltage drop |
| 2 | 92 | 62 | Various magnetic field parameters |
| 10 | 100 | 70+74 | Balun transformer or transmatch |
| 19 | 109 | 79+89 | Various magnetic field parameters |

### C. § 325(d) is inapplicable

All grounds contain at least one of these references—**Simon**, **Zarsky**, and **Park** that were not before the Examiner. The issued patent of **Burnett-'870** was cited in an IDS, but not otherwise identified or applied to reject claims during prosecution. Ex-1003, 87; *see Digital Check Corp. v. E-Imagedata Corp.*, IPR2017-00178, Pap. 6, 12-13 (Apr. 25, 2017) (instituting IPR where references were cited in an IDS but "there is no indication in the record that the Examiner rejected any claims based on either reference or that the Examiner or applicant substantively discussed either reference during prosecution").

**Edoute** was cited in an IDS. Although a related patent (Edoute-'727) was applied as the primary reference[4] in an obviousness combination in an office action

[4] Here, **Edoute** is applied as a secondary reference to **Simon** that was not before the Examiner.

to earlier pending claims, it was never distinguished by Applicant; rather Applicant cancelled all pending claims after Examiner applied Edoute-'727. Edoute-'727 was thus never applied to the claims at issue. *See* §V.B. The Examiner also never considered the testimony of Dr. Bikson (Ex-1002) regarding these references. Ex-1003.

Importantly, for each independent claim, the Examiner failed to consider the references and/or combinations presented herein that teach the recited features Examiner found to be missing in the prior art. Referring to the table in §V.B above, the Examiner failed to consider that a voltage drop was known and conventional and within a POSITA knowledge; that **Simon** or **Burnett-'870** teaches the various magnetic field parameters; and that **Zarsky** discloses a balun transformer and a transmatch. *See* §VIII. **Park** provides the rationale not before the Examiner on why a POSITA would modify a magnetic device to utilize the teachings of radiofrequency electrode and application in a combined treatment. The Examiner further erred by (1) applying Edoute-'727 as the primary reference, and (2) never combining **Simon** in view of Edoute-'727.

Accordingly, the "same or substantially the same art or arguments" were not previously presented to the Office during prosecution. *Thorne Research v. Trustees of Dartmouth College*, IPR2021-00491, Pap. 18, *8-9 (PTAB Aug. 12, 2021) (granting institution; finding first prong of *Advanced Bionics* not satisfied

when prior art reference considered by Examiner was combined with references not cited during prosecution); *Advanced Bionics, LLC v. Med-El Elektromedizinische Gerate GMBH*, IPR2019-01469, Pap. 6, *8-9.

## VI. LEVEL OF ORDINARY SKILL IN THE ART

On or before 4/28/2015, a POSITA would have had a bachelor's degree in biomedical engineering, electrical engineering, physics, or related field, and two or more years of professional experience working with the design, development, and/or use of devices that apply electromagnetic energy to stimulate biological tissue. Additional graduate education could substitute for professional experience, or significant experience in the field could substitute for formal education. Bikson, ¶¶1-39.

## VII. CLAIM CONSTRUCTION

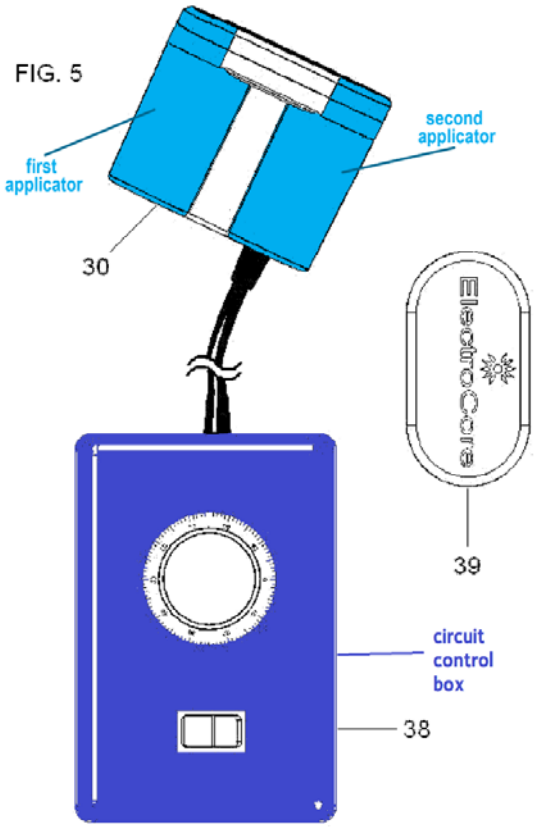
Claim terms subject to IPR are to be construed according to the *Phillips* standard applied in district court. §42.100(b). Petitioner applies the plain and ordinary meanings of terms. Only terms necessary to resolve the controversy must be construed. *Nidec Motor v. Zhongshan Broad Ocean Motor*, 868 F.3d 1013, 1017 (Fed. Cir. 2017). Bikson, ¶¶114-115.

## VIII. GROUNDS OF UNPATENTABILITY

### A. Ground 1: Claims 2-9, 11, 14 are rendered obvious by Simon in view of Edoute, Zarsky, and Ishikawa

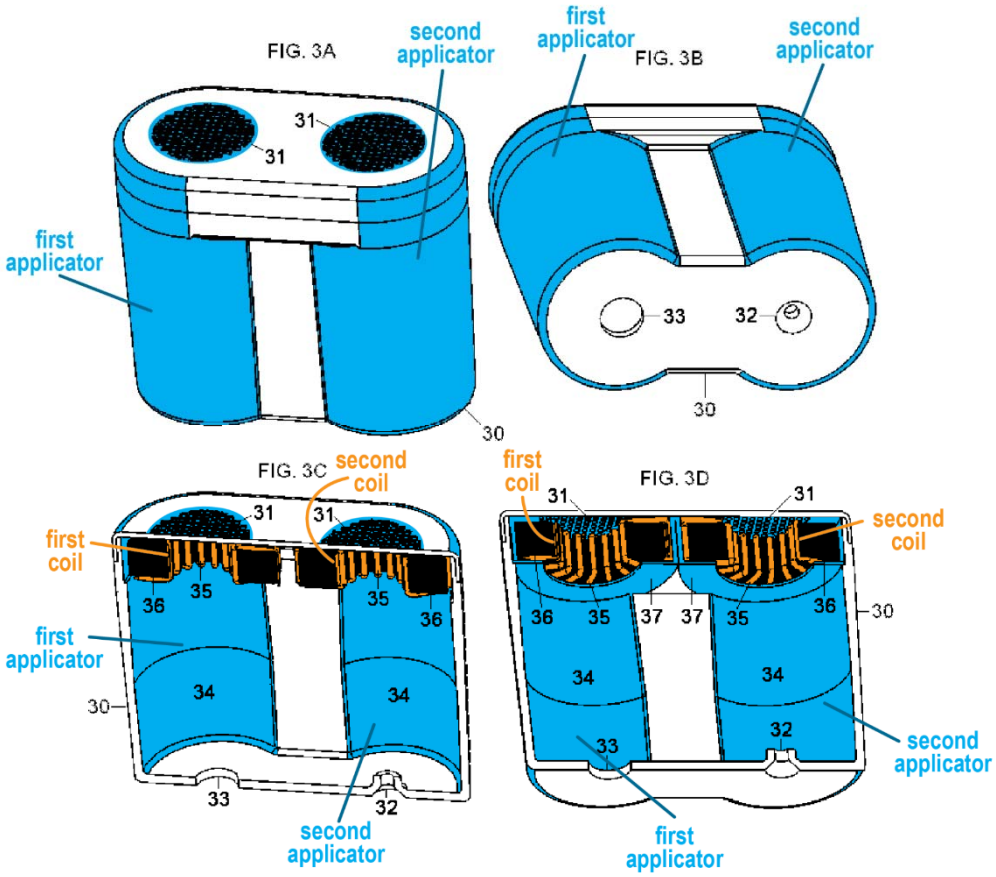
#### 1. Simon Overview

**Simon** discloses a magnetic stimulator used to deliver "energy" to "target tissue," *e.g.*, for muscle "[r]ehabilitation." Simon, *Title*, *Abstract*, [0002], [0197].




Simon, Fig. 5, [0103]. Figures 3A-3D (annotated) show **Simon's** stimulator with two **applicators** situated within a "housing," each **applicator** containing a "**coil**" that generates a time-varying magnetic field when a capacitor is "discharged."

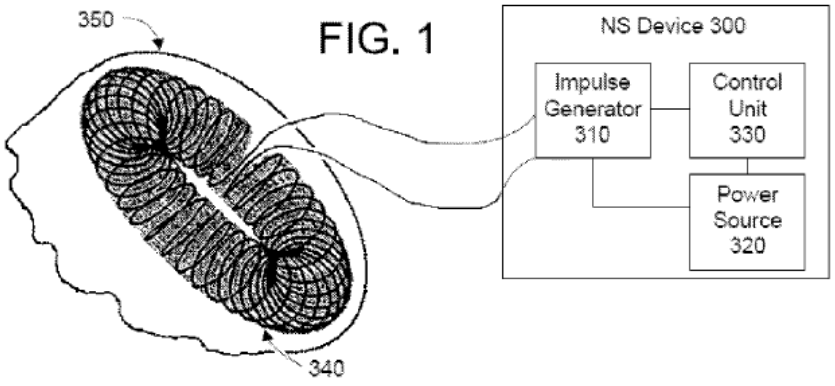
Simon, [0012], [0045], [0047], [0098]. Bikson, ¶¶116-117.



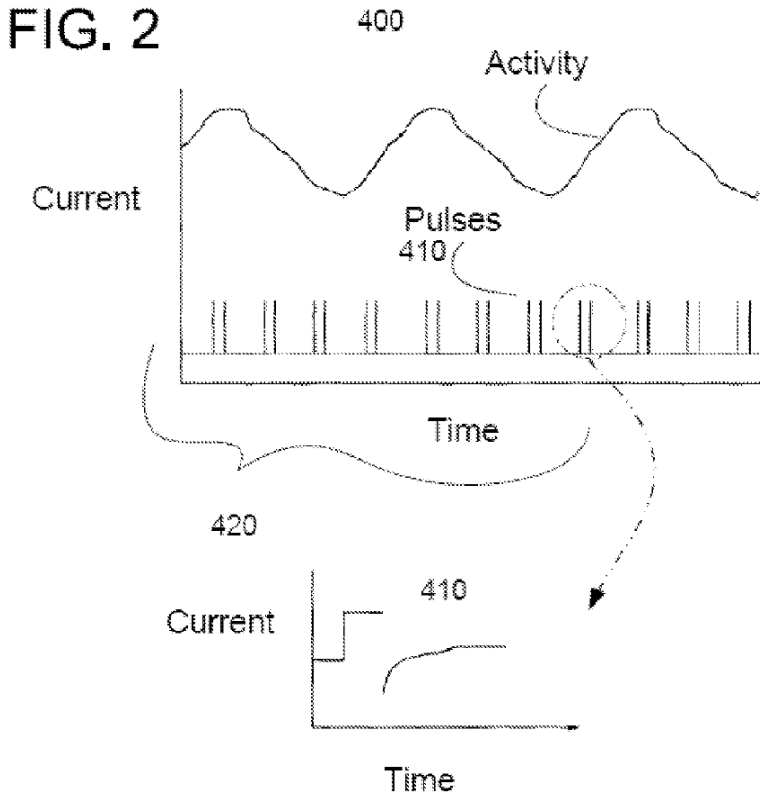

Each **coil** "induces an electromagnetic field" to apply "electrical impulses" to muscles within target body regions (*e.g.*, abdomen). Simon, [0024], [0027]-[0028], [0035], [0053]. Simon's stimulator may contain more than two **applicators**, with varying shapes and configurations for different applications based on the "anatomical location of the stimulation and determining the appropriate pulse configuration." Simon, [0031], [0100]-[0102], Fig. 4C-4D. Bikson, ¶¶118-119.

**Simon's** device has an "impulse generator," containing a capacitor and

connected to a "control unit" causing the impulse generator to generate a signal for each **coil**. Simon, [0019], [0057], Fig. 1. The control unit controls the capacitor via switching. Simon, [0019]. The impulse generator may contain a "bank of capacitors" discharged to coils at different times such that multiple, and serial pulses may be generated. Simon, [0019], [0063]. Bikson, ¶120.




**Simon's** coils generate consecutive "energy impulses" to stimulate tissue:




Simon, Fig. 2, [0002], [0029], [0035]. **Simon** teaches adjustable parameters for the stimulation signal including power level, frequency, pulse amplitude, and repetition rate. Simon, [0059], [0063]-[0064], [0104]. Moreover, **Simon** recognizes magnetic stimulator coils "overheat" during "extended" use, so it discloses solutions such as "cool[ing] the coils" with flowing water, air, or "ferrofluids." Simon, [0020]. Bikson, ¶¶121-124.

**Simon** discusses the "Agilent 33522A Function/Arbitrary Waveform Generator," which is a HF (30MHz) generator—see Simon [0057], Bikson ¶125—but to the extent argued **Simon** lacks a detailed disclosure of a high-frequency generator and radiofrequency electrode configured to apply radiofrequency waves

to a patient, heating tissue, a POSITA would have found it obvious to modify **Simon**'s device to do so for the reasons discussed below in §VIII.A.3; VIII.C—*e.g.*, as the '187 patent concedes, RF stimulation was known. '187, 1:39-47. Indeed, it was also well-known and conventional that RF-and-magnetic treatments provided a complementary effect to increase skin rejuvenation, and may reduce side effects compared to separate treatments. *See, e.g.*, Edoute, [0196]-[0197]; Park, [0029]-[0030], [0034]-[0036] (describing benefits when combining radiofrequency-and-magnetic treatment). Such modification would predictably work and provide the expected functionality given that **Simon** already discloses a device with applicators to provide tissue treatment, and radiofrequency electrodes may be utilized within the applicators. Simon, [0012], [0045], [0047], [0098]. Bikson, ¶125.

**2. Edoute Overview**

**Edoute** is directed to a device for "simultaneously emit[ting] RF and magnetic pulses" to target body regions for *e.g.*, "muscle contractions." Edoute, *Abstract*, [0328], [0243]. **Edoute's** device contains electrodes 41, each containing a "coil" serving as a "pulsed electromagnetic frequency generator (2);" electrodes are adapted both to "provid[e] electromagnetic pulses…[and] apply[] heat" via "RF radiation" to a "region of a patient's skin":

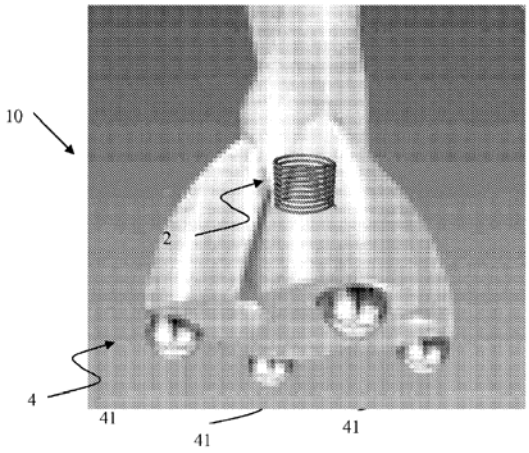



FIG. 1B

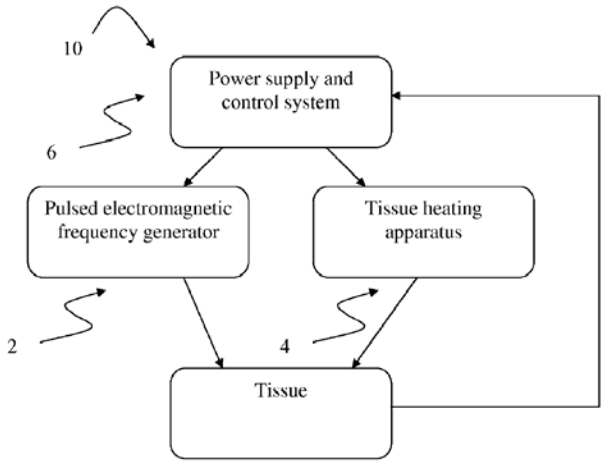



FIG. 2

Edoute, Figs. 1B, 2, [0015]-[0017], [0098]-[0099], [0197]-[0198]; [0129]-[0130] (various pulse frequencies and durations, *e.g.*, 16 or 25Hz; 5ms duration.) Bikson, ¶126. RF/heat is applied via the "**electrodes**"—"Radio Frequency" is defined as frequencies of 3Hz-30GHz. Edoute, [0021]-[0023], [0165].

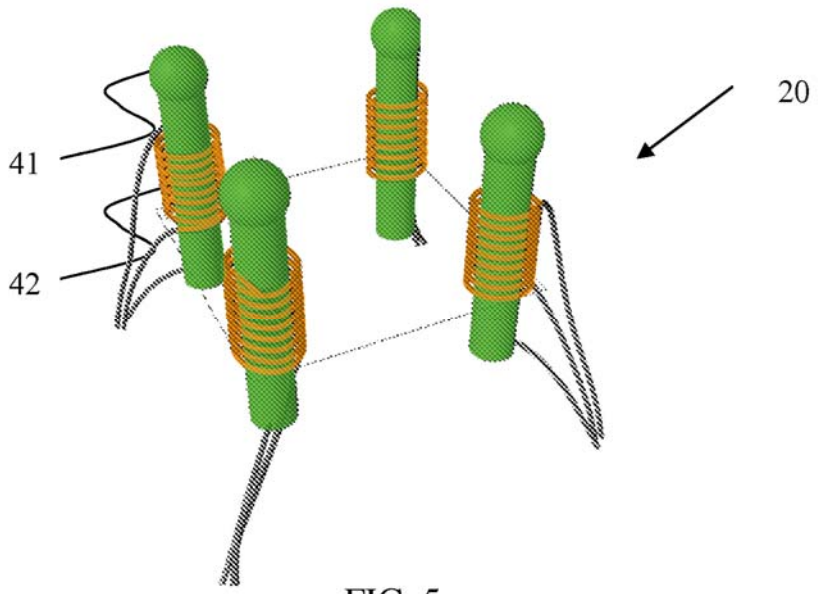



FIG. 5

Edoute, Fig. 5 (color-annotated).

**Edoute** describes that RF/heating of tissue via electrodes causes "tissue injury" promoting collagen fibers and resulting in "overall tightened and rejuvenated appearance of the skin." Edoute, [0201]-[0207]. Simultaneously, **Edoute's** coil generates pulsed magnetic fields that provide "non-thermal" effects on tissue, *e.g.*, there may be "muscle contractions" during treatment. Edoute, [0006]-[0008], [0041]. **Edoute** discloses a complementary effect on tissue improvement resulting from simultaneous heat (RF) and electromagnetic stimulation. Edoute, [0200] (by exposing "tissue" to "combination of regulated heat and a pulsed electromagnetic [field], a synergic effect of improving skin rejuvenation is obtained"). While **Edoute's** device applies "heat" to patient's skin, it recognizes compatibility with "a mechanism for skin cooling." Edoute, [0117].

Bikson, ¶¶127-128.

### 3. Zarsky Overview

**Zarsky** is directed to applying electromagnetic energy, specifically radiofrequency, to heat subcutaneous tissues and tightening skin. Zarsky, *Abstract*, [0019]. Figure 1 shows the schematic diagram of a "system 16" with "electrodes 6" for applying radiofrequency to a target body region. Zarsky, [0019], [0024]. Bikson, ¶129.

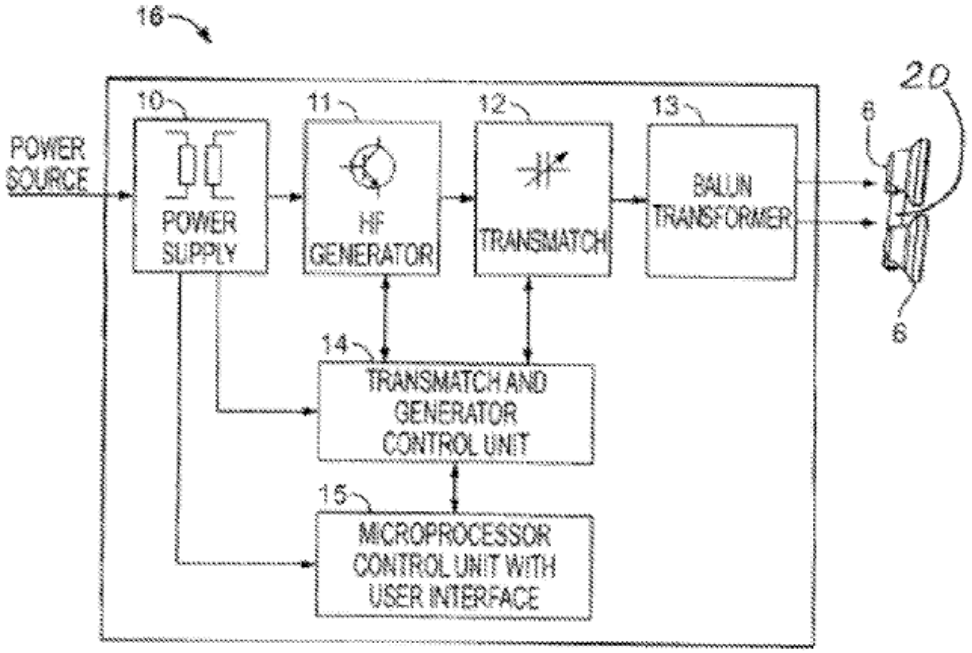



FIG. 1

Figure 1 illustrates high frequency (HF) generator 11 is connected to a power supply 10 receiving energy from a power source, a transmatch 12, and a balun transformer 13, and microprocessor control unit controls generation of the RF waves. Zarsky, [0019]–[0021]; Bikson, ¶130.

#### 4. Ishikawa Overview

**Ishikawa** is directed to a method for "magnetically stimulating" the "body" by applying a time-varying magnetic field to "nerve," "muscle," or "tissue." Ishikawa, *Abstract*, [0065], [0002]. A "litz wire coil" is used to supply "pulse[d] electric current" to the body via a magnetic field. Ishikawa, [0002]. **Ishikawa** teaches that "various…coil devices for magnetic treatment were known," and discloses using a "litz wire coil" in such devices to ensure that coils do not overheat and cause "danger of burn" to a patient. Ishikawa, [0005]-[0006]. **Ishikawa** discloses exemplary wire diameter of "0.2-1.5mm." Ishikawa, [0046]. Bikson, ¶131.

#### 5. Motivation to Combine

**Simon** discusses the "Agilent 33522A Function/Arbitrary Waveform Generator," which is a HF (30MHz) generator—*see* Simon [0057], Bikson ¶132—but lacks a detailed disclosure of radiofrequency treatment generated by a HF generator and applied simultaneously to a body region with **Simon's** magnetic treatment. A POSITA would have been motivated and found it obvious to apply radiofrequency treatment to provide "skin tightening and rejuvenation," improving the overall visual appearance of a patient undergoing muscle toning treatment. *See* Edoute [0196]-[0197]. **Simon** discloses "repeated," lengthy treatments, *e.g.*, "1 to 200 minutes" per session (Simon, [0022], [0111], [0123], [0141]), including

muscle "rehabilitation" (Simon, [0197]). Such treatments cause muscle toning/shaping; it was well-known that muscles "contract" while stimulated—but shaping muscles without treating skin might cause skin sagging or other unwanted visual appearances. Simon, [0158] ("signal causes the smooth muscle…to contract"), [0194], [0195]; Bikson, ¶¶43-44. **Edoute** teaches application of radiofrequency energy heats the dermis, stimulates collagen production and leads to an "overall tightened and rejuvenated appearance of the skin." Edoute, [0201]. A POSITA would have understood and found it obvious to apply radiofrequency treatment alongside magnetic treatment to improve the overall visual appearance by tightening skin as muscles are toned/adipose tissue is reduced, *e.g.*, to provide additional skin tightness alongside muscle toning, and to prevent skin sagging or stretch marks during muscle treatment. Edoute, [0199]-[0202]; Sokolowski, [0003]-[0005] ("stimulation leads to a breakdown of fatty tissue"). Bikson, ¶¶43-71. Moreover, **Edoute** discloses that simultaneous RF-and-magnetic treatment may provide a complementary effect of increasing skin rejuvenation and may reduce side effects compared to separate treatments. Edoute, [0196]-[0197], [0199]-[0200]. Such modification would predictably work and provide the expected functionality given that **Simon** already discloses a device with applicators to apply treatment to the body, suggests RF treatment capability, and **Edoute** discloses utilizing a coil and an RF electrode in an applicator to apply simultaneous

RF-and-magnetic treatment. Herbst, incorporated into **Simon**, additionally discloses setting repetition rates for multiple output channels such that **Simon**'s device would support simultaneous RF-and-magnetic stimulation with different frequencies. Herbst, [0031], [0037]. Bikson, ¶¶132-134.

**Simon** and **Edoute** are in the same field of endeavor—treatment devices using electromagnetic stimulation of tissue—also analogous art to the '187. **Simon** is directed to a "magnetic stimulation device" for "target tissue" including muscles; **Edoute** is directed to a device for tissue "rejuvenation," *e.g.* for applying "dynamic magnetic field" to "injured tissue" to promote "rapid and improved healing." Simon, *Title*, *Abstract*, [0029]-[0030]; Edoute, *Abstract*, [0010], [0015]-[0017], [0234], [0284]. A POSITA would have recognized **Edoute** provides teachings of radiofrequency waves applied to a patient via a radiofrequency electrode such that a complementary effect is provided (Edoute, [0196]-[0197], [0199]-[0200]); such teachings could be used in **Simon's** treatment device, and applying those teachings would have been straightforward and predictably worked. Bikson, ¶¶135-136.

POSITAs would have been motivated and found it obvious to modify **Simon** in view of **Zarsky's** teachings of an RF circuit in view of **Edoute's** teachings that combined treatment is beneficial. **Simon** discloses its device may "measure impedance" such that the "power of the stimulating coil may be modulated" when

impedance changes are detected. Simon, [0185]-[0186], [0195]. A POSITA would have been motivated to apply **Edoute's** radiofrequency teachings to **Simon,** utilizing **Zarsky's** teachings of an RF circuit. A POSITA would have understood that a transmatch would be used to conduct "impedance" matching, and a balun transformer would be used to convert unbalanced impedance to balanced impedance, such that treatment parameters based on "tissue impedance" may be modified. **Zarsky** discloses providing energy from "HF [high-frequency] generator" to a "Transmatch 12" for impedance matching to a target body structure, such as skin, and a "Balun Transformer 13," which "converts unbalanced impedance to balanced impedance," as depicted below in Fig. 1:

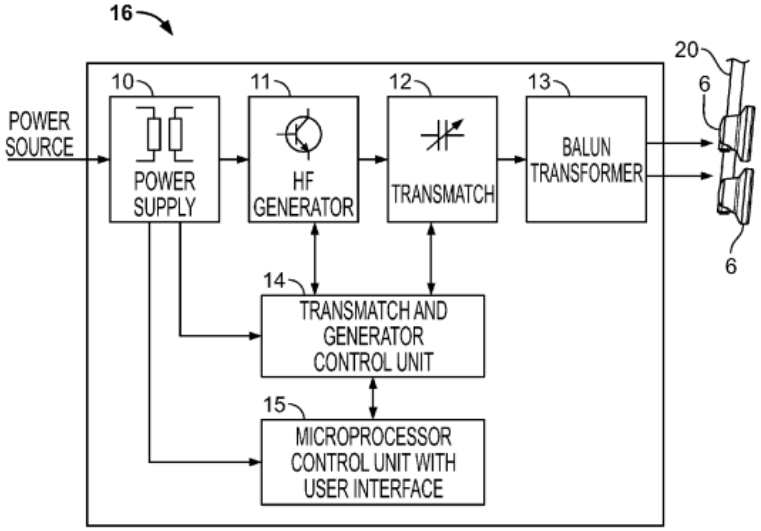



FIG. 1

Zarsky, [0019]-[0021], Fig. 1; *see also* '187, Fig. 6 (identical disclosure to Zarsky Fig. 1). Bikson, ¶137.

Because **Edoute** leaves the implementation details of a radiofrequency circuit to a POSITA, a POSITA would have been motivated to modify **Simon's** treatment device with the teachings of **Zarsky's** known transmatch in a radiofrequency circuit. It was well-known to use a transmatch for impedance matching (*e.g.*, Zarsky, Fig. 6, [0019]-[0021]) and a POSITA would have been motivated to provide the radiofrequency signal of **Simon's** device modified using **Edoute's** teachings to a transmatch in order to adjust an impedance of a radiofrequency electrode to correspond with an impedance of the biological structure of the patient as **Simon** discloses measuring "impedance," *e.g.*, when determining whether to adjust power. Simon, [0195]. A POSITA would have had a reasonable expectation of success in applying **Zarsky's** teachings of a transmatch to **Simon's** system, allowing **Simon's** device to match impedance of the radiofrequency electrode to the patient's biological structure/skin as **Simon** already discloses measuring impedance. *Id.* Bikson, ¶¶137, 100-101.

Moreover, because **Edoute** leaves the implementation details of a radiofrequency circuit to a POSITA, a POSITA would have been motivated to modify **Simon's** device with the teachings of **Zarsky's** balun transformer in a radiofrequency circuit. It was well-known to use a balun transformer to convert an unbalanced radiofrequency signal to a balanced signal. *E.g.*, Choi, [0072] ("[a] variety of types of baluns are well-known in the art…"); [0094] ("balun may be

required" to convert "balanced" to "unbalanced" signals in "RF" device). For example, figure 1 of **Zarsky** shows that the "HF Generator 11," which provides energy at "13.56 or 40.68 or 27.12 MHz, or 2.45 GHz," is connected to "Balun Transformer 13," which "converts unbalanced impedance to balanced impedance." Zarsky, [0019], [0021]. Bikson, ¶137. A POSITA would have been motivated to provide energy in **Simon's** system to a balun transformer in order to convert an unbalanced to a balanced radiofrequency signal such that it may be supplied to a transmatch for impedance matching purposes, and would have had a reasonable expectation of success in doing so. Choi, [0072], [0094], [0099], Bikson, ¶137.

**Zarsky** is in the same field of endeavor as **Simon, Edoute,** and the '187 (*see* §VIII.A.3): electromagnetic stimulation of a patient's body. Zarsky, *Abstract*, [0019]. Thus, **Zarsky** is also analogous art to the '187. **Zarsky** discloses applying radiofrequency via electrodes to a target body region, and discloses a schematic diagram for generating RF energy, including power source, power supply, high frequency generator, transmatch, and balun transformer to provide RF energy to the electrodes. Zarsky, [0019]–[0021], [0024]. A POSITA would have recognized **Zarsky** provides additional circuitry details for radiofrequency stimulation, so applying those teachings into **Simon's** muscle/tissue stimulation device modified by **Edoute's** RF teachings would have been straightforward and predictably worked. Bikson, ¶137.

**Ishikawa** is also in the same field of endeavor as **Simon, Edoute,** and the '187: electromagnetic stimulation of tissue. Ishikawa, *Abstract*, [0065], [0002]. Thus, **Ishikawa** is also analogous art to the '187. A POSITA would have recognized **Ishikawa** provides additional details regarding **Simon's** coil used to apply magnetic stimulation, resulting in reduced "burn" risk and increasing "power consumption efficiency and stimulation efficiency," so modifying **Simon** with the teachings of **Ishikawa's** magnetic stimulation device would have been straightforward and predictably worked. Ishikawa, [0005]-[0006], [0101], Bikson, ¶138.

POSITAs would have found it routine, straightforward and advantageous to modify **Simon's** device to apply **Edoute's** RF teachings and **Zarsky's** RF-circuit teachings of a transmatch and balun transformer in its design in view of **Simon's** disclosure of measuring impedance, and would have known such a combination (yielding the claimed limitations) would predictably work and provide the expected functionality. Moreover, POSITAs would have found it routine, straightforward and advantageous to modify **Simon's** coil to utilize **Ishikawa's** "0.2-1.5mm" "litz wire" teachings in view of **Simon's** disclosure of avoiding coil "overheat[ing]" (Simon, [0041]) and of increasing stimulation "effic[iency]" (Simon, [0037]), and would have known such a combination (yielding the claimed limitations) would predictably work and provide the expected functionality. *See*

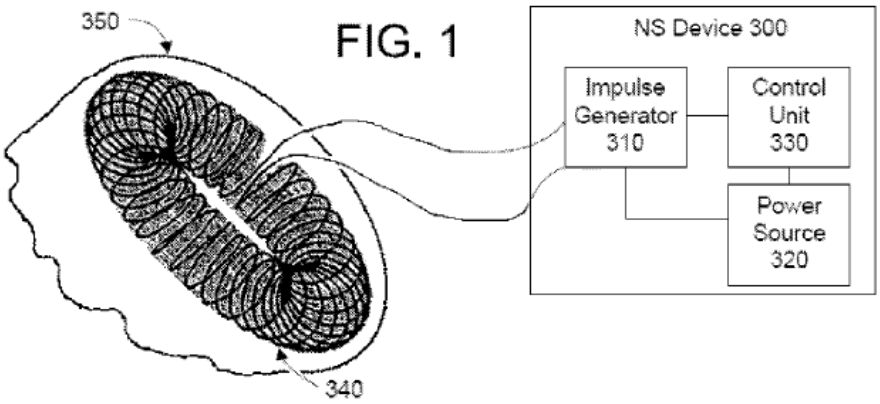
*KSR Intern. Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1731 (2007). Bikson, ¶139.

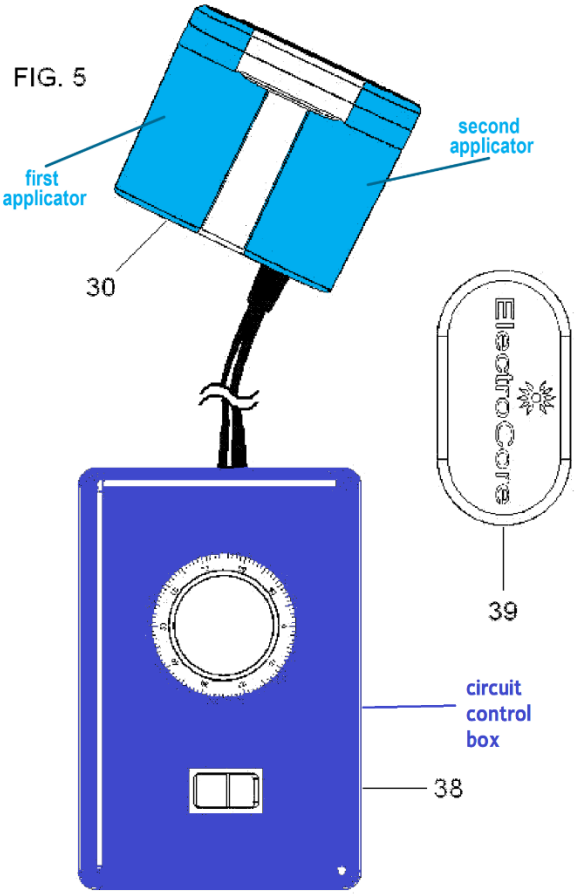
### 6. Claim Charts

#### a. Independent Claim 2

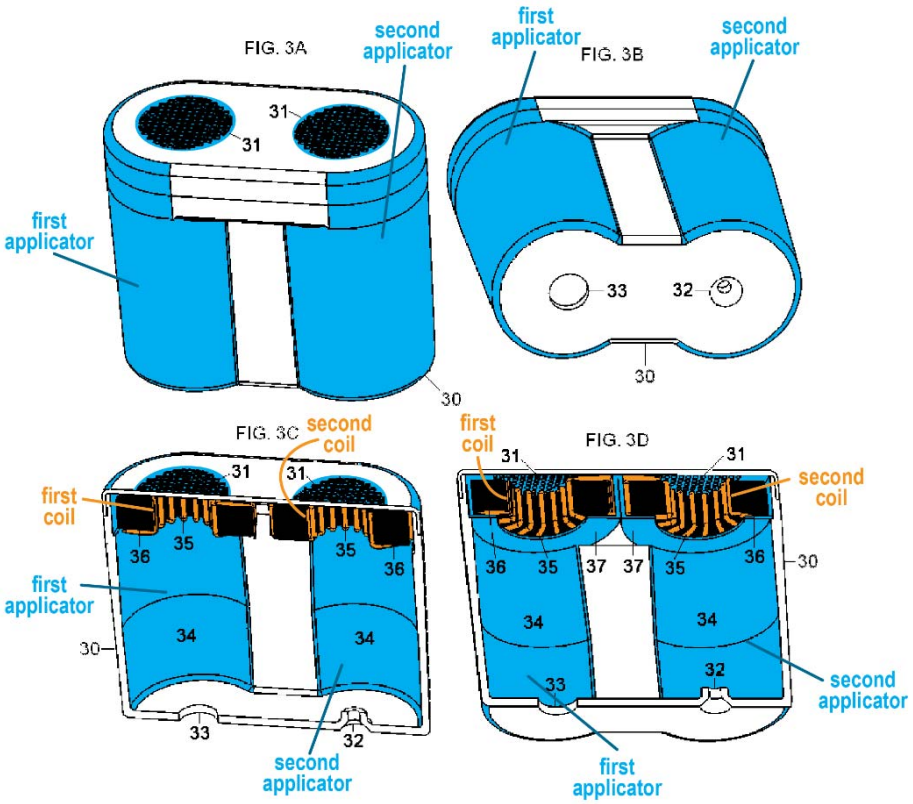
| Claim Elements | Simon in view of Edoute, Zarsky, and Ishikawa |
|---|---|
| **[2.pre]** A method for treating a biological structure of a patient by a time-varying magnetic field and radiofrequency waves, comprising: | **Simon discloses a method for treating a biological structure of a patient by a time-varying magnetic field** (*e.g.* "time-varying magnetic field")<br><br>**Simon** discloses "[m]agnetic stimulation devices and methods of therapy" for muscle "rehabilitation," *i.e.*, treating a patient. Simon, *Title*, *Abstract*, [0197].<br><br>**Simon** discloses an "apparatus" that induces a "time-varying magnetic field" to apply "energy" to a target region within a "patient." Simon, *Abstract*, [0015], [0023]-[0024], [0053]. The apparatus are placed on "abdomen" in order to produce an "intended beneficial physiological effect." Simon, [0035]-[0036]. Bikson, ¶¶140-141, 43-71.<br><br>**Simon in view of Edoute teaches a method for treating a biological structure of a patient by radiofrequency waves** (*e.g.*, "RF radiation" of Edoute)**.**<br><br>**Edoute** discloses applying "RF radiation," *e.g.*, via "electrodes," *e.g.*, to a patient's "dermis." Edoute, [0013], [0015]-[0017], [0020]. **Edoute** discloses treating regions of the body, *e.g.*, the "face and neck." Edoute, [0330], [0331]. **Edoute** defines radio frequency/RF as referring to "part of the electromagnetic spectrum with frequency range of about 3 Hz to 300 GHz." Edoute, [0165]-[0166].<br><br>Heat is applied to the patient's skin through "at least one electrode…in direct physical contact with the skin" or "at least one electrode…not in physical contact with the skin." Edoute, [0236]-[0238]. **Edoute** discloses that heat application using RF waves may "cause[] contraction and tightening of collagen fibers" or collagen production, |

| Claim Elements | Simon in view of Edoute, Zarsky, and Ishikawa |
|---|---|
| | "result[ing] in an overall tightened and rejuvenated appearance of the skin." Edoute, [0201].<br><br>**Edoute** indicates that pulsed radiofrequency treatments were approved for use on patients by the FDA "two decades" prior to **Edoute's** priority date. Edoute, [0008].<br><br>POSITAs would have been motivated and found it obvious to apply **Edoute's** simultaneous RF-and-magnetic stimulation to **Simon's** device to increase skin tightness when toning muscles in order to improve overall visual appearance by tightening skin as muscles are toned/adipose tissue is reduced, *e.g.*, to provide additional skin tightness alongside muscle toning, and to prevent skin sagging or stretch marks during muscle treatment. Edoute, [0199]-[0202] (application of RF/heat leads to "overall tightened and rejuvenated appearance of the skin"); Sokolowski, [0003]-[0005] ("stimulation leads to a breakdown of fatty tissue"); §VIII.A.5. Bikson, ¶¶72-75.<br><br>Moreover, **Edoute** discloses that simultaneous RF-and-magnetic treatment may provide a complementary effect of increasing skin rejuvenation and may reduce side effects compared to separate treatments. Edoute, [0196]-[0197], [0199]-[0200]. Bikson, ¶¶140-149, 72-75. |
| **[2.a]** a. providing energy from an energy source to an energy storage device and/or to a high-frequency generator; | **Simon discloses providing energy from an energy source** (*e.g.*, "power source") **to an energy storage device** (*e.g.*, "capacitor")**.**<br><br>**Simon** discloses a device with "an impulse generator" coupled to a "power source" and "control unit": |

| Claim Elements | Simon in view of Edoute, Zarsky, and Ishikawa |
|---|---|
| |  <br>Simon, Fig. 1, [0054].<br><br>The "impulse generator" contains an energy storage device: "a capacitor," which stores energy when "[charged]…under the control of a control unit." Simon, [0019].<br><br>A capacitor is "discharged" through each of **Simon's** coils when a user wishes to "apply [a] stimulus." Simon, [0019], [0025]. Bikson, ¶¶84-85.<br><br>**Simon teaches a high-frequency generator** (*e.g.*, "Agilent 33522A Function/Arbitrary Waveform Generator")**.**<br><br>**Simon** discusses the "Agilent 33522A Function/Arbitrary Waveform Generator," which is a HF generator (*e.g.*, 30MHz frequency). Simon, [0057]. It was known that high-frequency encompasses radiofrequency. *See, e.g.*, '187, 15:39-46 ("HF…generator" provides "energy for radiofrequency treatment"); Bikson, ¶¶150-152. |
| **[2.b]** b. providing energy from the energy storage device to a magnetic field generating device in order to generate the time- | **Simon discloses providing energy from the energy storage device** (*e.g.*, "capacitor") **to a magnetic field generating device** (*e.g.*, "coil") **in order to generate the time-varying magnetic field** (*e.g.*, "time-varying magnetic field") **with a magnetic flux density in a range of 0.1 to 7 T** (*e.g.*, "0.1 to 2 Tesla.")**, a repetition rate in a range of 1 to 700 Hz** (*e.g.*, "15 Hz to 50 Hz") **and with an impulse duration in a range of 10 to 900 µs** (*e.g.*, "10-1000 microseconds")**.** |

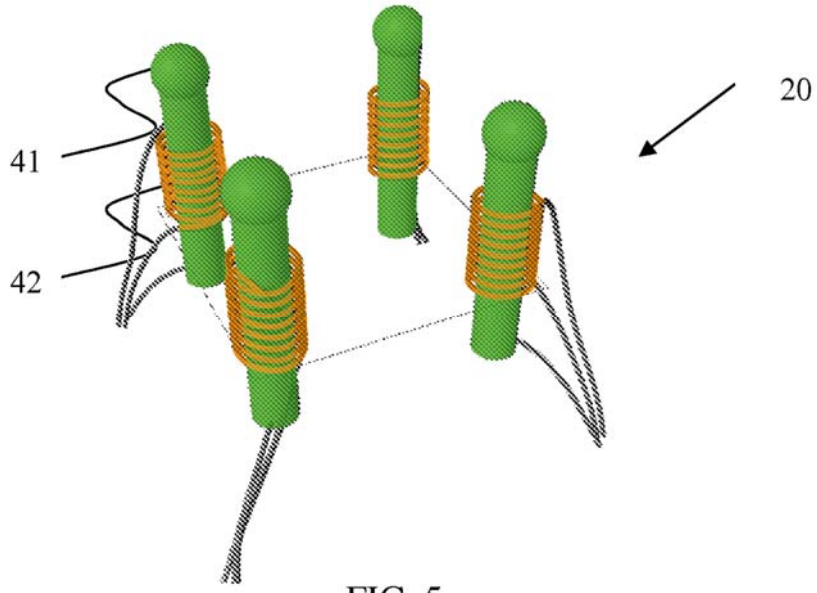
| Claim Elements | Simon in view of Edoute, Zarsky, and Ishikawa |
|---|---|
| varying magnetic field with a magnetic flux density in a range of 0.1 to 7 T, a repetition rate in a range of 1 to 700 Hz and with an impulse duration in a range of 10 to 900 μs; wherein the magnetic field generating device includes a conductor diameter less than 3 mm;[5] | *See* [2.pre]-[2.a]—**Simon** device uses a "stimulator 30" containing **applicators** and connected to "**circuit control box** 38":<br>  <br><br>Simon, Fig. 5 (annotated); [0103]. |

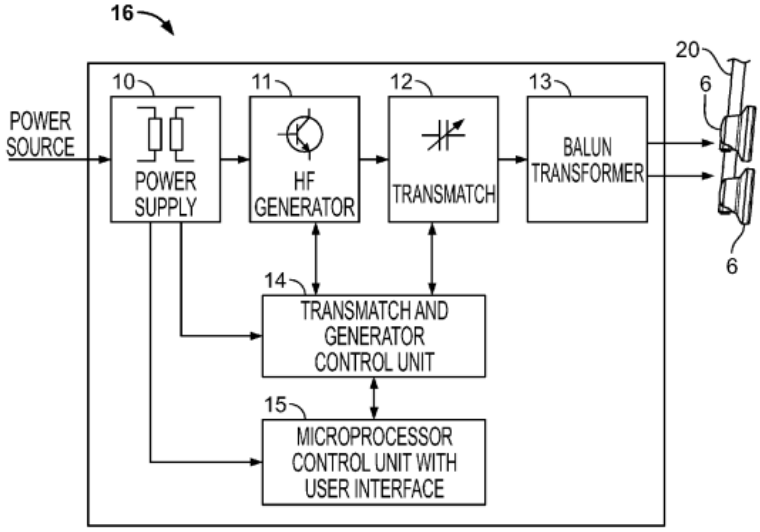
[5] For claim limitations [2.b], [2.d], [4], [9], [10.e], [11]-[12], [18] reciting a specific range, the claimed range is obvious in view of prior art's teachings that "overlap or lie inside" the range or even do not overlap but are merely close, absent an explicit showing that the claimed range is critical in achieving unexpected results relative to the prior art's range. MPEP § 2144.05; *see also In re Wertheim,* 541 F.2d 257 (CCPA 1976); *In re Brandt*, 886 F.3d 1171, 1177, (Fed. Cir. 2018). The prior art teaches the claimed range and the '187 specification describes no such unexpected results.

| Claim Elements | Simon in view of Edoute, Zarsky, and Ishikawa |
|---|---|
| | The stimulator may have two **applicators** "that lie side-by-side," each containing a "**coil[]**" disposed in "its own housing":<br>  <br><br>Simon, Fig. 3A-D (annotated), [0031], [0098].<br><br>**Simon** is not limited to two **applicators**; the shapes and configurations vary based on "anatomical location of the stimulation." Simon, [0031], [0100]-[0102], Fig. 4C-4D. A capacitor is "discharged" through each **coil** when a user wishes to "apply [a] stimulus." Simon, [0019], [0025].<br><br>**Simon** discloses its "stimulator" is "adjustable in regard to amplitude, duration, repetition rate and other variables." Simon, [0020], [0063], [0103].<br><br>**Simon** discloses "modulating impulse signal" at a "frequency" (*i.e.*, repetition rate) "about 1 Hz or greater, such as between about 15 Hz to 50 Hz". Simon, [0064]; *see also id.*, [0030], [0033], cl. 8. |

| Claim Elements | Simon in view of Edoute, Zarsky, and Ishikawa |
|---|---|
| | **Simon** discloses that "current passing through the coil produces a magnetic field within the core of about 0.1 to 2 Tesla." Simon, [0030], [0104].<br><br>Because **Simon's** coil is "wound around" (*i.e.*, touching) the core, magnetic field flux density at the core is also at surfaces of the coils. Simon, [0029]. **Simon** indicates that "coil" refers to current-carrying wire *and* to "core material," so flux density at the core is also the flux density at surfaces of the coils. Simon, [0015].<br><br>It was also known in the art to measure magnetic field strength at the coil surface where stimulus strength is at its highest. *E.g.*, Magstim, 8.<br><br>Simon discloses a "pulse" (referred to as "impulse" in the language of the patent) duration. Bikson, ¶¶45-53. Simon, cl. 9, [0033].<br><br>The impulse duration is, *e.g.*, about 50-1000 microseconds. Simon, cls. 9-10, [0030], [0033] ("pulse duration of between about 10-1000 microseconds"), [0104].<br><br>**Ishikawa teaches a conductor diameter** (*e.g.*, "[d]iameter of…conductor portion") **less than 3 mm** (*e.g.*, "0.2-1.5mm").<br><br>For example, Ishikawa discloses the diameter of the "conductor portion" including "bare wire" of its "litz wire coil" is "0.2-1.5mm." Ishikawa, *Abstract*, [0039], [0046]; '187, 4:34-37 (noting wire diameter is claimed "conductor diameter"). A POSITA would have been motivated to use Ishikawa's litz wire having diameter <3mm in **Simon's** coil(s), *e.g.*, as litz wire was known to prevent "danger of burn" and increasing "power consumption efficiency and stimulation efficiency"—**Simon** discloses avoiding coil "overheat[ing]" (Simon, [0041]) and of increasing stimulation "effic[iency]" (Simon, [0037]). *See, e.g.*, Ishikawa, *Abstract*, [0005]-[0006], [0039], [0046]; §VIII.A.5. |

| Claim Elements | Simon in view of Edoute, Zarsky, and Ishikawa |
|---|---|
| | Bikson, ¶¶153-166. |
| **[2.c]** c. providing energy from the high-frequency generator to a balun transformer in order to convert an unbalanced radiofrequency signal to a balanced radiofrequency signal and providing the balanced radiofrequency signal to a transmatch in order to adjust an impedance of at least one radiofrequency electrode to correspond with an impedance of the biological structure of the patient; and | **Simon teaches a radiofrequency electrode** (*e.g.*, "electrode," "coil" in second applicator;)**.**<br><br>*See* [2.a].<br><br>**Simon** discloses a two-applicator embodiment where one applicator may be used for RF and the second coil may be used for magnetic treatment. Simon, Fig. 5, [0031], [0055], [0078]-[0079]. The '187 concedes that a "coil [may] be the electrode for radiofrequency treatment," and Simon discloses each applicator contains a "coil," such that one coil may be used for RF. Simon, [0031] ("two…coils"), [0098]; '187, 15:65-66; Bikson, ¶¶77-79.<br><br>**Simon** additionally discloses electrodes which may be used for radiofrequency treatment when connected to the HF generator. **Simon** recognizes using "electrodes" on the "surface of the skin…without breaking the skin" for treatment. Simon, [0014].<br><br>To the extent argued **Simon** does not disclose a radiofrequency electrode, **Simon in view of Edoute and Zarsky teaches providing energy from the high-frequency generator** (*e.g.*, Zarsky's "HF generator") **to a balun transformer** (*e.g.*, Zarsky's "Balun Transformer 13") **in order to convert an unbalanced radiofrequency signal to a balanced radiofrequency signal and providing the balanced radiofrequency signal to a transmatch** (*e.g.*, Zarsky's "Transmatch 12") **in order to adjust an impedance of at least one radiofrequency electrode** (*e.g.*, Simon's "electrode," "coil" in second applicator; Edoute's "electrode") **to correspond with an impedance of the biological structure of the patient.**<br><br>**Edoute** is directed to a device for "simultaneously emit[ting] RF and magnetic pulses" to target body regions for *e.g.*, |

| Claim Elements | Simon in view of Edoute, Zarsky, and Ishikawa |
|---|---|
| | "superficial muscle contractions." Edoute, *Abstract*, [0328], [0243]. As shown in Fig. 5, **Edoute's** device contains a high-frequency generator, *i.e.* "electrical output device" to "generate RF…energy" as well as "**electrodes**" placed on a region of a patient to "apply said RF energy." Edoute, [0021]-[0023].<br>  <br><br>FIG. 5<br><br>POSITAs would have been motivated to apply **Edoute's** RF-and-magnetic stimulation treatment teachings in implementing **Simon's** device for the benefit of a combined treatment—*see* [2.pre]; §VIII.A.5. Bikson, ¶¶72-75.<br><br>**Zarsky** discloses providing energy from "HF [high-frequency] generator" to a "Transmatch 12" for impedance matching to a target body structure, such as skin, and a "Balun Transformer 13," which "converts unbalanced impedance to balanced impedance," as depicted below in Fig. 1: |

| Claim Elements | Simon in view of Edoute, Zarsky, and Ishikawa |
|---|---|
| |  <br>FIG. 1<br>Zarsky, [0019]-[0021], Fig. 1; *see also* '187, Fig. 6 (identical disclosure to Zarsky Fig. 1). Bikson, ¶¶100-101.<br><br>A POSITA would have been motivated to apply **Zarsky's** transmatch teachings when applying radiofrequency energy using **Simon's** device in view of **Edoute's** disclosed benefits of RF-and-magnetic combined therapy (*see* [2.pre]). It was well-known to use a transmatch for impedance matching (*e.g.*, Zarsky, Fig. 6, [0019]-[0021]) and a POSITA would have been motivated to provide the radiofrequency signal of **Simon's** device modified using **Edoute's** teachings to a transmatch in order to adjust an impedance of a radiofrequency electrode to correspond with an impedance of the biological structure of the patient as **Simon** discloses measuring "impedance," *e.g.*, when determining whether to adjust power. Simon, [0195]. A POSITA would have had a reasonable expectation of success in applying **Zarsky's** teachings of a transmatch to **Simon's** system, allowing **Simon's** device to match impedance of the radiofrequency electrode to the patient's biological structure/skin as **Simon** already discloses measuring impedance. *Id. See* §VIII.A.5. Bikson, ¶¶100-101. |

| Claim Elements | Simon in view of Edoute, Zarsky, and Ishikawa |
|---|---|
| | Moreover, a POSITA would have been motivated to apply **Zarsky's** balun transformer in a radiofrequency circuit such that radiofrequency treatment may be applied by **Simon's** device after applying **Edoute's** radiofrequency teachings. It was well-known to use a balun transformer to convert an unbalanced radiofrequency signal to a balanced signal. *E.g.*, Choi, [0072] ("[a] variety of types of baluns are well-known in the art…"); [0094] ("balun may be required" to convert "balanced" to "unbalanced" signals in "RF" device). For example, figure 1 of **Zarsky** shows that the "HF Generator 11," which provides energy at "13.56 or 40.68 or 27.12 MHz, or 2.45 GHz," is connected to "Balun Transformer 13," which "converts unbalanced impedance to balanced impedance." Zarsky, [0019], [0021]. Bikson, ¶100-101. A POSITA would have been motivated to provide energy in **Simon's** system to a balun transformer in order to convert an unbalanced to a balanced radiofrequency signal such that it may be supplied to a transmatch for impedance matching purposes, and would have had a reasonable expectation of success in doing so. Choi, [0072], [0094], [0099]. *See* §VIII.A.5. Bikson, ¶¶167-176. |
| **[2.d]** d. generating radiofrequency waves with a frequency in a range of 1 MHz to 900 GHz and with energy up to 400 W by the at least one radiofrequency electrode; | **Simon in view of Edoute teaches generating radiofrequency waves with a frequency in a range of 1 MHz to 900 GHz** (*e.g.*, Edoute's "300 GHz") **and with energy up to 400 W by the at least one radiofrequency electrode** (*e.g.*, Edoute's "electrode")**.**<br><br>*See* [2.pre]—Edoute defines radio frequency/RF as referring to "part of the electromagnetic spectrum with frequency range of about 3 Hz to 300 GHz." Edoute, [0165]-[0166].<br><br>**Edoute** discloses applying radiofrequency, and further discloses that "heat radiation parameters" include "power P"—power units are in Watts. Edoute, [0040]-[0042].<br><br>Edoute leaves the exact radiofrequency power to a POSITA, who would have been motivated to apply radiofrequency |

| Claim Elements | Simon in view of Edoute, Zarsky, and Ishikawa |
|---|---|
| | waves with energy up to 400W, especially because Edoute lists "0-100 Watt" as safe treatment parameters for the magnetic stimulation (Edoute, [0241]-[0242]) and warns against treating using radiation parameters that are "unsafe," which would include overly high-powered radiation that might injure the patient's skin beyond what is required for therapeutic effect. Edoute, [0293], [0201] (describing a certain level of "tissue injury" produces skin tightening, but POSITAs would understand further injury would be detrimental). Moreover, it was well-known to use radiofrequency waves with energy up to 400W. Zarsky, cl. 4, [0027] ("radio frequency…30-400 W per pulse").<br><br>POSITAs would have been motivated to apply **Edoute's** RF-and-magnetic stimulation treatment teachings in implementing **Simon's** device for the benefit of a combined treatment—*see* [2.pre]; §VIII.A.5. Bikson, ¶¶177-181, 72-75. |
| **[2.e]** e. applying the radiofrequency waves simultaneously with the time-varying magnetic field to the patient; and | **Simon in view of Edoute teaches applying the radiofrequency waves simultaneously with the time-varying magnetic field** (*e.g.*, "time-varying magnetic field") **to the patient.**<br><br>*See* [2.pre]—**Edoute** discloses "systems and methods" to apply "heat" and magnetic field "simultaneously" to a patient's "tissue." Edoute, *Abstract*, Figs. 1A, 2.<br><br>POSITAs would have been motivated to apply **Edoute's** RF-and-magnetic stimulation treatment teachings in implementing **Simon's** device for the benefit of a combined treatment—*see* [2.pre]; §VIII.A.5. Bikson, ¶¶182-184, 72-75. |
| **[2.f]** f. remodeling a target biological structure by simultaneous heating the biological structure and | **Simon in view of Edoute teaches remodeling a target biological structure by simultaneous heating the biological structure and contracting a muscle** (*e.g.*, "muscle contractions") **of a target body area.**<br><br>*See* [2.pre], [2.d]-[2.e]—**Simon** teaches—as was well-known—that muscles "contract" while stimulated. Simon, |

| Claim Elements | Simon in view of Edoute, Zarsky, and Ishikawa |
|---|---|
| contracting a muscle of a target body area. | [0158] ("signal causes the smooth muscle…to contract"), [0194], [0195]; Belanger, 234 (contraction leads to muscles getting "larger and stronger").<br><br>**Edoute** recognizes devices for "dermal remodeling" were known. Edoute, [0003]. **Edoute's** thermal treatment remodels tissue and skin by, *e.g.*, causing "tightening" and "rejuvenation." Edoute, [0014]-[0015].<br><br>Moreover, **Edoute** discloses applying electromagnetic pulses to "tissue" and discloses many of the conditions responsive to pulsed magnetic stimulation are "musculoskeletal" such that pulsed treatment is applied to muscles. Edoute, Fig. 5, [0008]. Edoute further discloses that "muscle contractions" are measured by sensing means during treatment. Edoute, [0040]-[0043].<br><br>POSITAs would have been motivated to apply **Edoute's** RF-and-magnetic stimulation treatment teachings in implementing **Simon's** device for the benefit of a combined treatment—*see* [2.pre]; §VIII.A.5. Bikson, ¶¶185-189, 43-75. |

### b. Dependent Claims 3-9, 11, 14

| Claim Elements | Simon in view of Edoute, Zarsky, and Ishikawa |
|---|---|
| **[3]** The method of claim 2 wherein the magnetic field generating device includes a litz-wire. | **Simon discloses a magnetic field generating device** (*e.g.*, "coil").<br><br>*See* [2.a]-[2.b]—Simon leaves the choice of the coils' wire to a POSITA.<br><br>**Ishikawa discloses the magnetic field generating device includes a litz-wire** (*e.g.*, Ishikawa's "litz wire"). |

| Claim Elements | Simon in view of Edoute, Zarsky, and Ishikawa |
|---|---|
| | A POSITA would have been motivated to apply **Ishikawa's** "litz wire coil" to **Simon's** magnetic stimulation device in order to prevent "burn[ing]" a patient and increase "power consumption efficiency and stimulation efficiency." Ishikawa, [0002], [0005]-[0006], [0101]; Simon, [0020] (warning against coil "overheat[ing]"); Simon, [0037] (discussing stimulation "effic[iency]"). **Simon** discloses a device having "wire…coil[s]." Simon, [0015], [0046], [0097]. However, Simon leaves the wire choice/wire thickness to a POSITA. **Ishikawa** discloses a "litz wire coil" for "magnetic treatment" systems that prevents high coil resistance which may lead to electrical loss as well as heat generation causing "danger of burn." *See, e.g.*, Ishikawa, *Abstract*, [0005]-[0006], [0039], [0046]. **Ishikawa** further discloses that using a "litz wire" coil may increase "power consumption efficiency and stimulation efficiency." Ishikawa, [0101].<br><br>A POSITA would have been motivated to use **Ishikawa's** disclosure of litz wire in **Simon's** coil such that "overheat[ing]" of the coils may be reduced and so that "power consumption efficiency and stimulation efficiency" are advantageously increased. Ishikawa, [0006], [0101]; Simon, [0020]. *See* §VIII.A.5.<br><br>Bikson ¶¶190-194. |
| **[4]** The method of claim 2 wherein a voltage drop between two successive peak amplitudes output from the energy storage device is not higher than 21%. | **Simon teaches wherein a voltage drop between two successive peak amplitudes output from the energy storage device** (*e.g.*, capacitor) **is not higher than 21%.**<br><br>*See* [2.pre]–[2.b]—To the extent argued **Simon** does not explicitly disclose a certain voltage drop up to 21%, POSITAs would have been motivated and found it obvious to operate **Simon's** device with a constant voltage, or a voltage drop between successive peak amplitudes up to 21%, to minimize the capacitor's charge time in repetitive discharge timing applications, increase repetition rate by recharging the energy |

| Claim Elements | Simon in view of Edoute, Zarsky, and Ishikawa |
|---|---|
| | storage during a previous pulse, and to still deliver a therapeutic amplitude as desired by the patient, as was well-known and conventional in the art. *See, e.g.*, Polson, 3:38-40 ("voltage…on the discharge capacitor is about 80% of its initial magnitude"); 1:37-54 (describing "replenish[ing] the charge" on a discharge capacitor such that "rate of discharge pulses" is increased); '187, 6:66-7:3 (similarly to Polson, a small voltage drop allows for "increase [in]…repetition rate" because energy storage device is recharged during previous pulse). Bikson, ¶97-99.<br><br>POSITAs would have been motivated and found it obvious to operate **Simon** so that a voltage drop between the capacitor's successive peak amplitudes is up to 21%, such that repetition rate may be increased by charging capacitors during the prior pulse, and to minimize any drop in the magnetic field's flux density during patient treatment. Bikson, ¶¶195-197. |
| **[5]** The method of claim 2 wherein the energy storage device is in a serial connection with the magnetic field generating device. | **Simon discloses the energy storage device** (*e.g.*, "capacitor") **is in a serial connection with the magnetic field generating device** (*e.g.*, "coil").<br><br>*See* [2.pre]-[2.b]—**Simon** discloses its "coil" may be connected either "in series or in parallel" to "impulse generator 310" which contains a "capacitor" to generate magnetic fields. Simon, [0054], [0019] ("capacitor in the impulse generator"). Bikson, ¶¶198-199, 84-85. |
| **[6]** The method of claim 2 further comprising directing a cooling media in a direction parallel to the magnetic field generating device. | **Simon teaches cooling the magnetic field generating device.**<br><br>**Simon** recognizes that "coils…overheat…over an extended period of time" and needed cooling. Simon, [0020].<br><br>**Simon** discloses that known cooling solutions existed, *e.g.*, "cool[ing] the coils with flowing water or air" or with "ferrofluids," which are known to be oil-based—and oil was also known as a coolant. Simon, [0020] (citing Ghiron). |

| Claim Elements | Simon in view of Edoute, Zarsky, and Ishikawa |
|---|---|
| | POSITAs would have understood **Simon** directs a cooling fluid in a direction parallel to the coils because the fluid line goes alongside with and into the coils such that the cooling fluid flows through the coils to maximize surface area and time contacting the coils to efficiently dissipate heat. *See* '187, Fig. 2 (fluid flows alongside the coils as indicated by the arrows). Bikson, ¶¶200-203, 86-90. |
| **[7]** The method of claim 2 further comprising directing a cooling media over at least upper and lower sides of the magnetic field generating device. | **Simon teaches cooling the magnetic field generating device.**<br><br>*See* [6]—To the extent argued that **Simon** does not expressly disclose flowing coolant over the upper and lower sides, POSITAs would have been motivated and found it obvious to direct cooling media over all sides of the coil, which includes upper and lower sides to maximize surface area and time contacting the coils to efficiently dissipate heat. Bikson, ¶¶204-205, 86-90. |
| **[8]** The method of claim 2 with the magnetic field generating device including a blower for directing a cooling media and wherein the blower is on a circumference of the magnetic field generating device. | **Simon teaches cooling the magnetic field generating device.**<br><br>*See* [6]-[7]—**Simon** discloses "cool[ing] the coils with…air," *i.e.*, a blower. Simon, [0020]. Moreover, **Simon** cites Ghiron, which teaches it was well-known and conventional to use an air blower to move air in a magnetic field generation device. *See, e.g.*, Ghiron, 1:57-60 ("Conventional cooling solutions typically involve the use of …air cooling mechanism [that] may involve a fan that rapidly circulates cooled or room temperature air past the magnetic device."). Bikson, ¶¶206-207, 86-90. |
| **[9]** The method of claim 2 further comprising operating the device including the magnetic field | **Simon teaches operating the device including the magnetic field generating device** (*e.g.*, "coil") **to maintain a temperature of a casing of the magnetic field generating device up to 43° C.** |

| Claim Elements | Simon in view of Edoute, Zarsky, and Ishikawa |
|---|---|
| generating device in order to maintain a temperature of a casing of the magnetic field generating device up to 43° C. | *See* [2.pre], [6]-[8]—**Simon** recognizes maintaining device temperature to prevent "heat…[at] unacceptable levels. Simon, [0020]. **Simon** cites Ghiron for its disclosures of "cooling," and Ghiron indicates it was well-known to maintain casing temperature <43°C as was required by the FDA. Ghiron, 1:25-29 ("temperature of a magnetic stimulation device…should be kept below approximately 41.5° C to stay within…FDA guidelines"); *see also* Edoute, [0084], [0241] ("safe treatment parameters" of 30-80° "Celsius"); [0035]. Bikson, ¶¶208-209. |
| | |
| **[11]** The method of claim 10 wherein the magnetic field generating device includes a litz-wire having a conductor diameter less than 3 mm. | **Simon in view of Edoute, Zarsky, and Ishikawa teaches the magnetic field generating device** (*e.g.*, "coil") **includes a litz wire** (*e.g.*, "litz wire" of Ishikawa) **having a conductor diameter** (*e.g.*, Ishikawa's "[d]iameter of…conductor portion") **less than 3 mm** (*e.g.*, Ishikawa's "0.2-1.5mm").<br><br>*See* [2.b], [3]. *See* §VIII.A.5. Bikson, ¶¶210-211. |
| | |
| **[14.pre]** The method of claim 10 wherein the magnetic field generating device includes a litz-wire, | **Simon in view of Edoute, Zarsky, and Ishikawa teaches the magnetic field generating device** (*e.g.*, "coil") **includes a litz wire** (*e.g.*, "litz wire" of Ishikawa)**.**<br><br>*See* [3]. *See* §VIII.A.5. Bikson, ¶¶212-213. |
| **[14.a]** further comprising providing energy from the high-frequency generator to a balun transformer in order to convert | **Simon in view of Edoute, Zarsky, and Ishikawa teaches providing energy from the high-frequency generator** (*e.g.*, "HF Generator 11" of Zarsky) **to a balun transformer** (*e.g.*, "Balun Transformer 13" of Zarsky) **in order to convert an unbalanced radiofrequency signal to a balanced radiofrequency signal.** |

| Claim Elements | Simon in view of Edoute, Zarsky, and Ishikawa |
|---|---|
| an unbalanced radiofrequency signal to a balanced radiofrequency signal. | *See* [2.pre]–[2.a], [2.c]. *See* §VIII.A.5. Bikson, ¶¶214-215, 100-101. |

### B. Ground 2: Claims 10, 12-13, 15-18 are rendered obvious by Simon in view of Edoute and Zarsky[6]

#### 1. Claim Charts

##### a. Independent Claim 10

| Claim Elements | Simon in view of Edoute and Zarsky |
|---|---|
| **[10.pre]** A method for treatment of a biological structure of a patient by a time-varying magnetic field and radiofrequency waves, comprising: | **Simon in view of Edoute teaches a method for treatment of a biological structure of a patient by a time-varying magnetic field** (*e.g.*, "time-varying magnetic field") **and radiofrequency waves.**<br><br>*See* [2.pre]. *See* §VIII.A.5. Bikson, ¶¶217-219. |
| **[10.a]** a. providing energy from an energy source to an energy storage device and/or to a high-frequency generator; | **Simon discloses providing energy from an energy source** (*e.g.*, "power source") **to an energy storage device** (*e.g.*, "capacitor"); **Simon in view of Edoute teaches providing energy from an energy source to a high-frequency generator** (*e.g.*, Edoute's "electrical output device")**;.**<br><br>*See* [2.pre]-[2.a]. *See* §VIII.A.5. Bikson, ¶¶220-221. |
| **[10.b]** b. providing energy | **Simon discloses providing energy from the energy storage device** (*e.g.*, "capacitor") **to a magnetic field generating** |

[6] POSITAs would be motivated to combine Simon, Edoute, and Zarsky for the same reasons described above in §VIII.A.5.

| Claim Elements | Simon in view of Edoute and Zarsky |
|---|---|
| from the energy storage device to a magnetic field generating device in order to generate the time-varying magnetic field; | **device** (*e.g.*, "coil") **in order to generate the time-varying magnetic field** (*e.g.*, "time-varying magnetic field")**.**<br><br>*See* [2.pre]-[2.b]. Bikson, ¶¶222-223. |
| **[10.c]** c. applying the time-varying magnetic field to the patient; | **Simon discloses applying the time-varying magnetic field** (*e.g.*, "time-varying magnetic field") **to the patient.**<br><br>*See* [2.pre], [2.b], [2.e]. Bikson, ¶¶224-225, 43-71. |
| **[10.d]** d. providing energy from the high-frequency generator to a transmatch in order to adjust an impedance of a radiofrequency electrode to correspond with an impedance of a biological structure of the patient; | **Simon in view of Edoute and Zarsky teaches providing energy from the high-frequency generator** (*e.g.*, Edoute's "electrical output device") **to a transmatch** (*e.g.*, Zarsky's "Transmatch 12") **in order to adjust an impedance of a radiofrequency electrode** (*e.g.*, Edoute's "electrode") **to correspond with an impedance of a biological structure of the patient.**<br><br>*See* [2.pre], [2.c]. *See* §VIII.A.5. Bikson, ¶¶226-227. |
| **[10.e]** e. generating the radiofrequency waves by the radiofrequency electrode with a frequency of at least 1 MHz; applying the | **Simon in view of Edoute teaches generating the radiofrequency waves by the radiofrequency electrode** (*e.g.*, Edoute's "electrode") **with a frequency of at least 1 MHz** (*e.g.*, Edoute's "300 GHz")**; applying the radiofrequency waves to the patient.**<br><br>*See* [2.pre], [2.d]-[2.f]. *See* §VIII.A.5. Bikson, ¶¶228-229. |

| Claim Elements | Simon in view of Edoute and Zarsky |
|---|---|
| radiofrequency waves to the patient; and | |
| **[10.f]** f. heating the biological structure by the radiofrequency waves. | **Simon in view of Edoute teaches heating the biological structure** (*e.g.*, "tissue," "skin") **by the radiofrequency waves.**<br><br>*See* [2.pre], [2.d]-[2.f]. *See* §VIII.A.5. Bikson, ¶¶230-231. |

**b. Dependent Claims 12-13, 15-18**

| Claim Elements | Simon in view of Edoute and Zarsky |
|---|---|
| **[12]** The method of claim 10 wherein a voltage drop between two successive peak amplitudes output from the energy storage device is not higher than 21%. | **Simon teaches a voltage drop between two successive peak amplitudes output from the energy storage device is not higher than 21%.**<br><br>*See* [4]. Bikson, ¶¶232-233. |
| **[13]** The method of claim 10 wherein the energy storage device is in a serial connection with the magnetic field generating device. | **Simon discloses the energy storage device** (*e.g.*, "capacitor") **is in a serial connection with the magnetic field generating device** (*e.g.*, "coil")**.**<br><br>*See* [5]. Bikson, ¶¶234-235. |
| | |

| Claim Elements | Simon in view of Edoute and Zarsky |
|---|---|
| **[15]** The method of claim 10 further comprising directing a cooling media in a direction parallel to the magnetic field generating device. | **Simon teaches directing a cooling media in a direction parallel to the magnetic field generating device** (*e.g.*, "coil")**.**<br><br>*See* [6]. Bikson, ¶¶236-237. |
| **[16]** The method of claim 10 further comprising directing a cooling media over at least upper and lower sides of the magnetic field generating device. | **Simon teaches directing a cooling media over at least upper and lower sides of the magnetic field generating device** (*e.g.*, "coil")**.**<br><br>*See* [6]-[7]. Bikson, ¶¶238-239. |
| **[17]** The method of claim 10 further comprising directing a cooling media on a circumference of the magnetic field generating device. | **Simon teaches directing a cooling media on a circumference of the magnetic field generating device** (*e.g.*, "coil")**.**<br><br>*See* [6]-[8]. Bikson, ¶¶240-241. |
| **[18]** The method of claim 10 further comprising operating a treatment device including the magnetic field generating device in order to maintain a temperature of a casing of the | **Simon teaches operating a treatment device including the magnetic field generating device in order to maintain a temperature of a casing of the magnetic field generating device** (*e.g.*, "coil") **up to 43° C.**<br><br>*See* [2.pre], [9]. Bikson, ¶¶242-243. |

| Claim Elements | Simon in view of Edoute and Zarsky |
|---|---|
| magnetic field generating device up to 43° C. | |

### C. Grounds 3-4: Claims 2-9, 11, 14 are rendered obvious by Simon in view of Edoute, Park, Zarsky, and Ishikawa; Claims 10, 12-13, 15-18 are rendered obvious by Simon in view of Edoute, Park, and Zarsky [7]

#### 1. Park Overview

**Park** discloses a "wearable energy delivery system" that applies a combination of pulsed electromagnetic field and heat energy for "firming and toning of skin and muscles, and enhanced athletic performance" as shown in Figure 8. Park, *Abstract*, [0004], [0007], [0022], [0027].

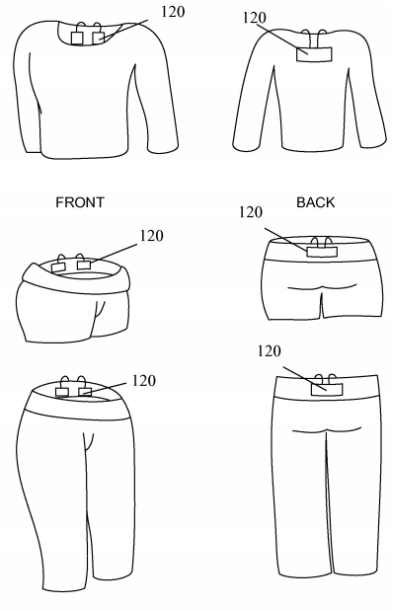



**Fig. 8**

[7] POSITAs would be motivated to combine Simon, Edoute, Zarsky, and Ishikawa for the same reasons described above in §VIII.A.5.

**Park** discloses its device that is integrated with an article of clothing delivers a combination of energy such as pulsed electromagnetic field and radio frequency. Park, [0029]. The combination of different energies are beneficial in many ways, including "firming and tightening of skin and muscles, especially in the gluteal, abdominal, and pectoral muscles," and "energizing muscles." Park, [0030]. For example, pulsed electromagnetic field provides "long-term" and "deeper therapeutic effects" for muscle stimulation; and heat energy, such as radiofrequency, provides "soothing effect to skin and short-term relief." Park, [0034]–[0036]. Bikson, ¶¶245-246.

Figures 5A–D (color-annotated) illustrates different configurations of **Park**'s combination device 110 applying magnetic fields through **coils 112** and a heat energy source (*e.g.*, RF) via **electrodes 114**. Park, [0061]–[0065]. Bikson, ¶247.

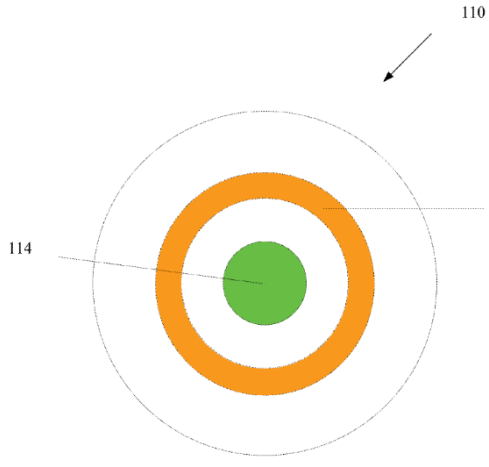



Fig. 5A

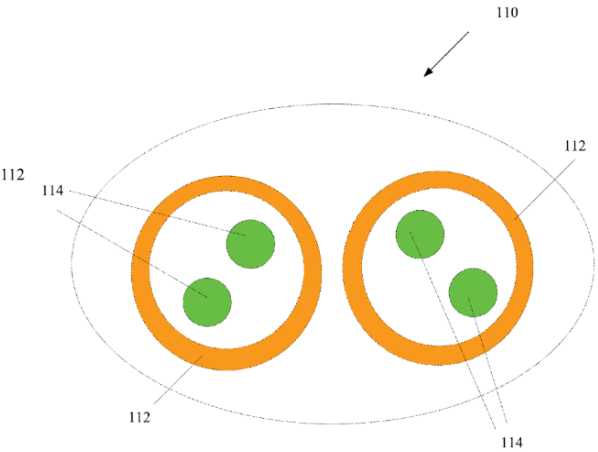



Fig. 5B

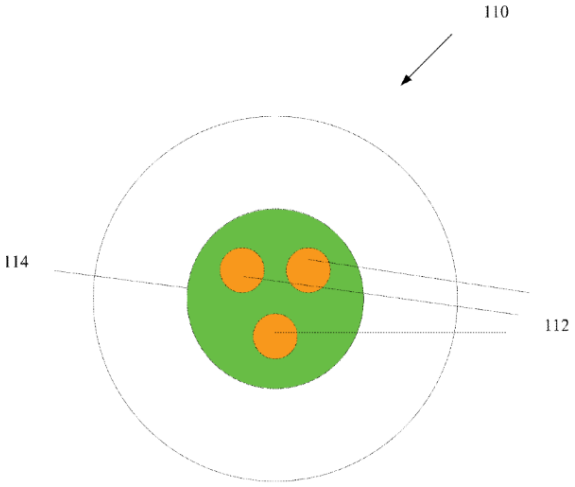



Fig. 5C

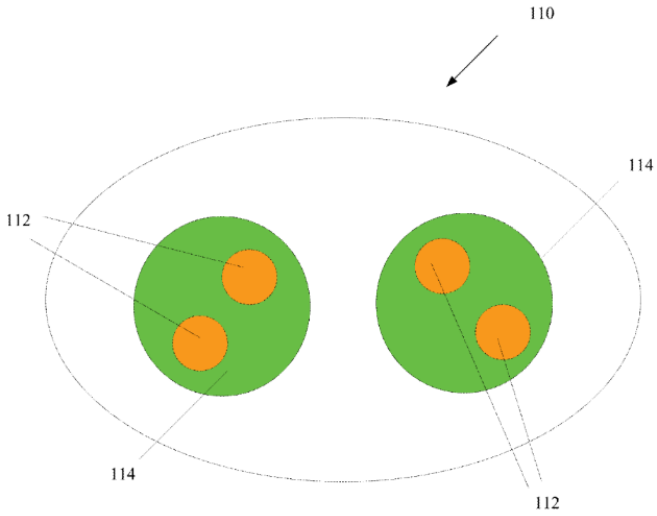



Fig. 5D

### 2. Discussion

Claims 10, 12-13, and 15-18 are rendered obvious by **Simon** in view of **Edoute** and **Zarsky** (*see* §§VIII.B) and claims 2-9, 11, 14 are rendered obvious in further view of **Ishikawa** (§VIII.A), for the reasons discussed above. POSITAs would further have been motivated and found it obvious to modify **Simon** in view of **Edoute's** and **Zarsky's** radiofrequency teachings in further view of **Park's** teachings that the combined RF-and-magnetic treatment is beneficial. Bikson, ¶248.

**Park** discloses that the combined treatment of pulsed electromagnetic field and heat energy (including RF) provides a complementary effect when firming/toning skin and muscle; magnetic field provides long-term and deeper therapeutic effects on muscle stimulation, and heat energy (such as RF) providing

short-term relief on muscle and a soothing effect on skin. Park, *Abstract*, [0027], [0030], [0034]-[0036]. In light of these known benefits of POSITAs would have been motivated and found it obvious to apply **Park**'s teaching of a combination treatment with RF to improve the therapeutic and soothing effect of **Simon's** device on tissue/muscle, and further looked to **Zarsky** for implementation details of an RF circuit and electrodes. Furthermore, such improvement would merely be combining known techniques for known benefits as the '187 recognizes that "radiofrequency treatment" is one of "the most common methods used for non-invasive aesthetic applications" and its effect was known to be "based specifically on heat production in the biological structure." '187, 1:39-47. Bikson, ¶249.

**Park** is in the same field of endeavor as **Simon, Edoute**, and **Zarsky** — electromagnetic stimulation of a patient's body—and is analogous art to '187. **Park** discloses applying electromagnetic stimulation to tissues. Park, [0036]. Bikson, ¶250.

In light of the above, a POSITA would have found it routine, straightforward, and advantageous to modify **Simon's** magnetic stimulation device to apply **Edoute**'s teachings of applying radiofrequency treatment using **Zarsky**'s RF circuit, in view of the complimentary effects of the combined magnetic field and RF treatment explained by **Park**, and would have known such a combination yielding the claimed limitations would predictably work and provide the expected

functionality. Bikson, ¶251; *see also KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 401-02 (2007).

### D. Ground 5: Claims 2-18 are rendered obvious by Burnett-'870 in view of Park and Zarsky

#### 1. Burnett-'870 Overview

**Burnett-'870** discloses applying time-varying magnetic fields sufficient to "cause contraction of muscle fibers," thereby "toning" muscles. Burnett-'870, *Title, Abstract,* [0003], [0011], [0227]. **Burnett-'870**'s device has multiple applicators comprising coils to generate magnetic fields on a patient's target muscles, as shown in Figure 9B where "coils 106" are disposed in an "abdominal garment" covering the patient's abdomen/buttocks. Burnett-'870, *Abstract*, [0070], [0114]. Bikson, ¶¶252-253.

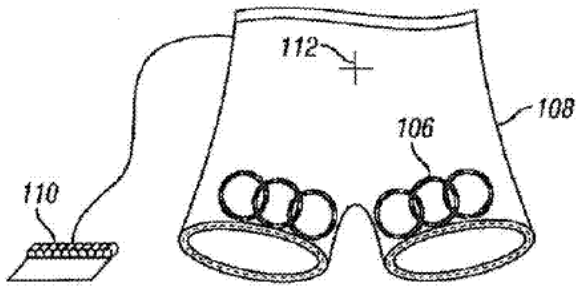



FIG. 9B

**Burnett-'870** discloses cooling the coil by direct contact with liquid coolant. Burnett-'870, [0210], [0215], [0235], Fig. 35. Bikson, ¶254.

**Burnett-'870** uses a "logic controller" to power the coils and to adjust the parameters of the magnetic fields, based on feedback from a sensor or the patient. Burnett-'870, *Abstract,* [0070], [0018]–[0082], [0134], [0196]. The parameters include, *e.g.*, the magnetic field's "amplitude" and "frequency of stimulation." Burnett-'870, [0070], [0085], [0087], [0117], [0129]. **Burnett-'870** discloses it was known to include a "capacitor" in the device, and uses a "switch" to control energy charging/discharging among components including the controller and the applicators. Burnett-'870, [0013]–[0014], [0085], [0111]. **Burnett-'870** leaves the powering of coils to a POSITA. Burnett-'870, [0130]. Bikson, ¶255.

**Burnett-'870** discloses that its device may deliver "high frequencies" and "ultrahigh frequencies" which would encompass radiofrequency. Burnett-'870, [0117]. It explicitly states that its device may apply stimulations such as a "RF field" Burnett-'870, [0133]. Burnett-'870 further discloses an embodiment of its device comprising **conductive coils 212** and "microneedle patch **228… having one or more electrodes** 232" as illustrated in Fig. 12. Burnett-'870, [0135]; *id.*,[0075], [0116] ("a transcutaneous stimulator, such as an electrode 126"), [0139]-[0140], [0150], [0157]-[0160], Figs. 22-23; *see also id.*, [0002] (incorporating by reference **Burnett-'325** disclosing "radio frequency-powered microstimulators that include electrodes" were known (Burnett-'325, [0022])).

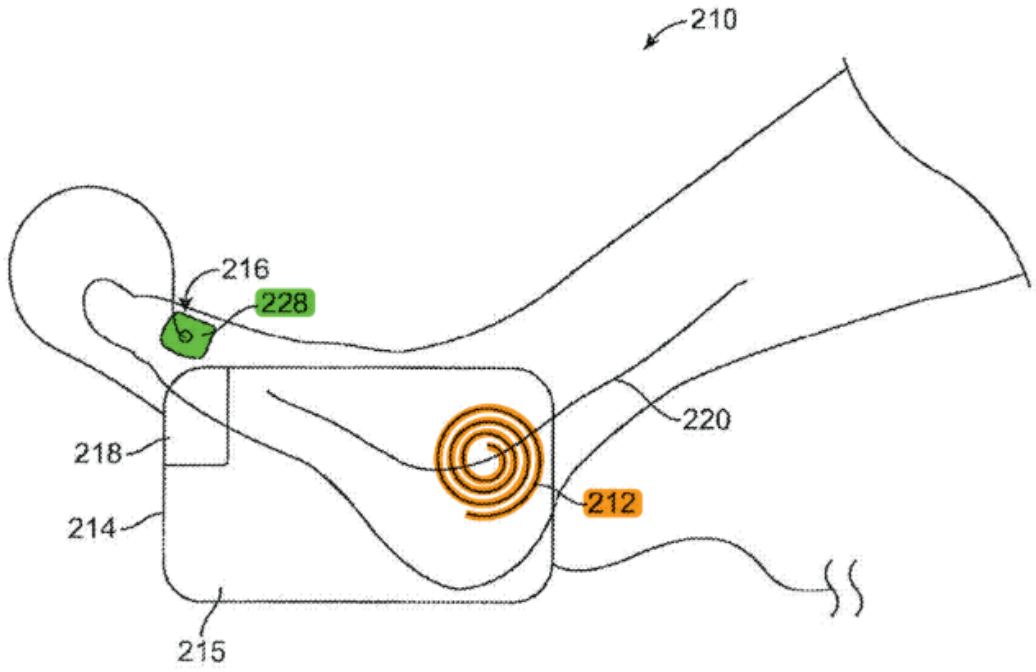



FIG. 12

To the extent argued **Burnett-'870** lacks particular disclosure of a radiofrequency electrode and circuit configured to apply radiofrequency waves for heating tissues, a POSITA would have found it obvious to modify **Burnett-'870**'s device to do so for the reasons discussed below in §VIII.D.2—*e.g.*, it was well-known and conventional that RF-and-magnetic treatments provided a complementary effect for firming and toning skin and muscle. Park, [0029]-[0030], [0034]-[0036]. Such modification would predictably work and provide the expected functionality given that **Burnett-'870** already discloses a device with coils and electrodes to provide tissue treatment, and applying stimulation using radiofrequency. Bikson, ¶¶256-257.

### 2. Motivation to Combine

**Burnett-'870** discloses a device applying magnetic field to stimulate muscles. Burnett-'870, *Abstract*. **Burnett-'870** further discloses applying radiofrequency treatment to tissues and using a device with coils and electrodes for simultaneous application. Burnett-'870, [0117], [0133], [0135]. To the extent argued that **Burnett-'870** does not explicitly disclose a combination device that applies magnetic field and radiofrequency to a target body region, POSITAs would have been motivated and found it obvious to modify **Burnett-'870**'s in view of **Zarsky**'s teachings of an RF circuit and electrodes in view of **Park**'s teachings that the combined treatment is beneficial. Bikson, ¶258.

**Park** discloses that the combined treatment of pulsed electromagnetic field and heat energy (which includes RF) is advantageous for firming and toning skin and muscle especially in buttocks and abdomen. Park, *Abstract*, [0027], [0030]. The two energies are complimentary with magnetic field providing long-term and deeper therapeutic effects on muscle stimulation, and heat energy (such as RF) providing short-term relief on muscle and a soothing effect on skin. Park, [0034]–[0036]. Because **Burnett-'870** shares the same objective for muscle toning and skin treatment (*e.g., Abstract*, [0011], [0133], [0148]) and its device is also integrated in an article of clothing (such as "abdominal garment") similar to **Park's** wearable, POSITAs would have been motivated and found it obvious to

apply **Park**'s teaching of a combination treatment with RF to improve the therapeutic and soothing effect of **Burnett-'870**'s device on skin and muscle, and further look to **Zarsky** for implementation details of an RF circuit and electrodes. Furthermore, such improvement would merely be combining known techniques for known benefits as the '187 recognizes that "radiofrequency treatment" is one of "the most common methods used for non-invasive aesthetic applications" and its effect was known to be "based specifically on heat production in the biological structure." '187, 1:39–47. Bikson, ¶259.

Similar to **Burnett-'870** and **Park, Zarsky** is also directed to applying electromagnetic energy for tightening skin and tissue. Zarsky, *Abstract*, [0019]. **Zarsky** discloses applying radiofrequency via electrodes to a target body region, and discloses a schematic diagram for generating RF energy, including power, source, power supply, high frequency generator, transmatch, and a balun transformer to provide RF energy to the electrodes. Zarsky, [0019]–[0021], [0024]. POSITAs would have found it routine, straightforward and advantageous to modify **Burnett-'870**'s device to apply **Zarsky**'s teachings of an RF circuit and electrodes in its design in view of the complimentary effects of the combined magnetic field and RF treatment explained by **Park**, and would have known such a combination (yielding the claimed limitations) would predictably work and provide

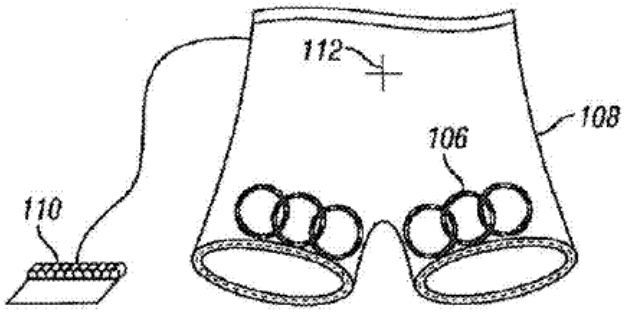
the expected functionality. *See KSR Intern. Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1731 (2007). Bikson, ¶260.

**Burnett-'870**, **Park**, and **Zarsky** are in the same field of endeavor—electromagnetic stimulation of a patient's body—and are analogous art to '187. **Burnett-'870** and **Park** disclose applying magnetic field and RF waves to stimulate tissues. Burnett-'870, *Abstract*; Park, [0036]. **Zarsky** discloses applying electromagnetic energy such as RF to tighten skin and heat targeted body area. Zarsky, *Abstract*, [0019]. Bikson, ¶261.

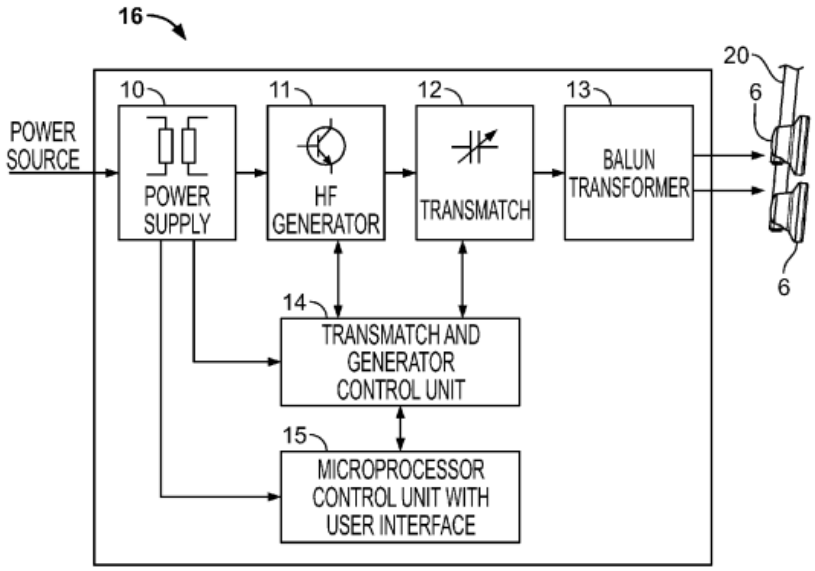
### 3. Claim Charts

#### a. Independent Claims 2 and 10

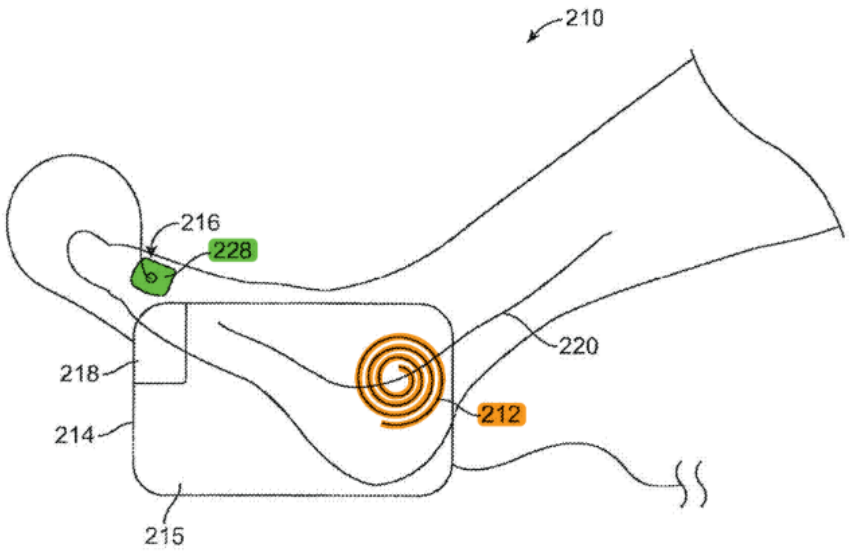
| Claim Elements | Burnett-'870 in view of Park and Zarsky |
|---|---|
| **[2.pre]** A method for treating a biological structure of a patient by a time-varying magnetic field and radiofrequency waves, comprising: | **Burnett-'870 teaches a method for treating** (*e.g.*, "toning") **a target biological structure** (*e.g.*, "muscle") **of a patient by a time-varying magnetic field and radiofrequency waves.**<br><br>**Burnett-'870** discloses "systems and[] methods for electromagnetic induction therapy" of a "patient" using "body contoured applicators" including "coils configured to generate an electromagnetic or magnetic field focused on a target nerve, muscle or other body tissues"; "toning tissue with focused, coherent EMF [electromagnetic field]"; and "causing muscles to contract." Burnett-'870, *Abstract*, [0006], [0011], [0225]–[0226]. **Burnett-'870** discloses the magnetic fields are "time varying" and "pulsed." Burnett-'870, [0003]. Figure 9B illustrates two applicators, each with a set of coils 106, disposed within an "abdominal garment" covering and treating left and right sides of a patient's buttocks/abdomen. Burnett-'870, [0114]. |

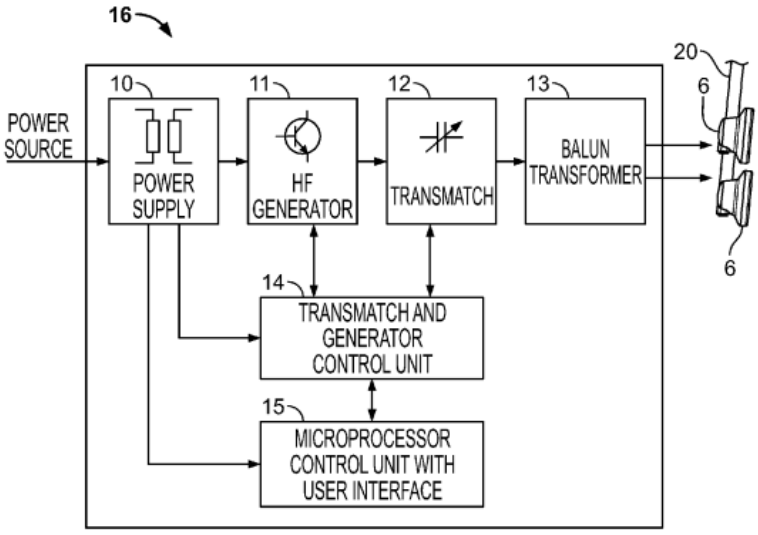
| Claim Elements | Burnett-'870 in view of Park and Zarsky |
|---|---|
| |  <br>FIG. 9B<br><br>**Burnett-'870** discloses a "stimulation source" may be "a RF field," which is known to be high frequency. Burnett-'870, [0133], [0117] (deliver "high frequencies…and ultrahigh frequencies."). **Burnett-'870** incorporates by reference ([0002]) Burnett-'325 disclosing that "radio frequency-powered microstimulators that include electrodes" were known. Burnett-'325, [0022].<br><br>To the extent argued **Burnett-'870** does not explicitly treat tissue with radiofrequency waves, **Zarsky** discloses applying electromagnetic energy, specifically radiofrequency, to heat subcutaneous tissues and tighten skin. Zarsky, *Abstract*, [0019]. In view of the teachings from **Park** ([0005], [0029], [0036]) for the benefits of combination treatment, POSITAs would have been motivated and found it obvious to modify **Burnett-'870**'s device to apply **Zarsky**'s teaching of radiofrequency treatment such that both magnetic field and RF are applied simultaneously, which would reduce the total treatment time, and provide synergistic effects compared to separate treatments. *See* VIII.D.2. Bikson, ¶¶262-265, 72-83. |
| **[2.a]** a. providing energy from an energy source to an energy storage device and/or to a high-frequency generator; | **Burnett-'870 teaches providing energy from an energy source** (*e.g.*, "power source") **to an energy storage device** (*e.g.*, "capacitor") **and/or to a high-frequency generator** (*e.g.*, "energy generator")**.**<br><br>*See* [2.pre] |

| Claim Elements | Burnett-'870 in view of Park and Zarsky |
|---|---|
| | **Burnett-'870** discloses its device includes a "power source" that is connected to a "logic controller." Burnett-'870, [0130], [0081], [0084], [0097] ("logic controller…manages the flow of electric power to coils…"). **Burnett-'870** further discloses it was known to use capacitors as energy storage devices in a magnetic stimulator. Burnett-'870, [0013]–[0014]. Indeed, its provisional application discloses using in its invention a LoFIT system described in Burnett-'185. Burnett-Provisional-'720, [0001]–[0002], [0020]. Burnett-'185 discloses incorporating a capacitor in the circuitry of the device, allowing it to be charged, and using a switch to discharge it to the coil. Burnett-'185, 6:66–7:2, 7:27–8:26. **Burnett-'870** also discloses using a "switch" to control stimulation. Burnett-'870, [0085], [0111] (disclosing "direct switching of the current circuit" between logic controller and sensor). Because a capacitor stores energy to be discharged, and a coil uses energy to generate a magnetic field, POSITAs would have understood that the capacitor is charged by an energy source, such that the energy is discharged, via a "switch" to the coil to generate the magnetic field, as was known in the art. *See, e.g.,* Magstim, 3–4, Fig. 2 ("a transformer charges a capacitor…and the capacitor is then connected to the coil via an electronic switch when the user wishes to apply the stimulus").<br><br>**Burnett-'870** discloses an "energy generator to produce, generate or deliver energy, *e.g.,* a magnetic or electromagnetic field." Burnett-'870, [0175], [0069]. **Burnett-'870** discloses that its device may deliver "high frequencies" and "ultrahigh frequencies." Burnett-'870, [0117]. A POSITA would have understood that such energy generator is high frequency because **Burnett-'870** discloses applying stimulation such as "a RF field," which is known to be high/ultrahigh frequency. Burnett-'870, [0133]; '187, 15:39-46 ("HF…generator" provides "energy for radiofrequency treatment"). POSITAs would have further understood that **Burnett-'870**'s "energy generator" receives |

| Claim Elements | Burnett-'870 in view of Park and Zarsky |
|---|---|
| | power from the "power source" to provide energy to an electrode applying "a RF field."<br><br>To the extent argued **Burnett-'870** does not explicitly discloses a "high-frequency generator" that receives energy from an energy source, **Zarsky** discloses a "HF Generator (high frequency generator) 11" connected to "power supply 10" that is connected to a "power source." Zarsky, [0019]. The "HF Generator 11" provides energy to "electrodes 6" that apply "radio frequency." Zarsky, [0024], [0026], [0014], cls. 1–10. In view of the teachings from **Park** ([0005], [0029], [0036]) for the benefits of combination treatment**,** POSITAs would have been motivated and found it obvious to modify **Burnett-'870**'s device to apply **Zarsky**'s teaching of a "high-frequency generator." *See* VIII.D.2. Bikson, ¶¶266-270.<br><br>  <br><br>FIG. 1 |
| **[2.b]** b. providing energy from the energy storage device to a | **Burnett-'870 teaches providing energy from the energy storage device** (*e.g.*, "capacitor") **to a magnetic field generating device** (*e.g.*, "applicator" comprising "coils") **in order to generate the time-varying magnetic field with a** |

| Claim Elements | Burnett-'870 in view of Park and Zarsky |
|---|---|
| magnetic field generating device in order to generate the time-varying magnetic field with a magnetic flux density in a range of 0.1 to 7 T, a repetition rate in a range of 1 to 700 Hz and with an impulse duration in a range of 10 to 900 μs; wherein the magnetic field generating device includes a conductor diameter less than 3 mm; | **magnetic flux density in a range of 0.1 to 7 T** (*e.g.*, "0.25 to 1.5 tesla")**, a repetition rate in a range of 1 to 700 Hz** (*e.g.*, "about 10 to 20 hertz,") **and with an impulse duration in a range of 10 to 900 μs** (*e.g.*, "50 μs")**; wherein the magnetic field generating device includes a conductor diameter less than 3 mm.**<br><br>*See* [2.pre]–[2.a].<br><br>**Burnett-'870** discloses "[o]peration of a conductive coil at about 10 to 20 hertz generating a magnetic field of about 0.25 to 1.5 tesla." Burnett-'870, [0195].<br><br>**Burnett-'870** incorporates by reference Burnett-'325. Burnett-'870, [0002]. Burnett-'325 discloses that it was known to use a magnetic field having an impulse of "a 50 μs duration." Burnett-'325, [0010]. **Burnett-'870** leaves it to POSITAs to choose an impulse duration, the range of 10 μs to 900 μs was known and conventional. *E.g.,* Magstim, 3 ("a pulse duration from 100-1000μs, dependent on stimulator type").<br><br>**Burnett-'870**'s coils, which are conductors, "have a variety of dimensions and configurations"—"The coil body may include any suitable number of turns….The end or cross section of the turn may have a width ranging from about 0.5 mm to about 5 mm…or from about 1 mm to about 2 mm…or about 0.2 mm to about 1.6 mm." Burnett-'870, [0201]. POSITAs would have understood that "cross section" here refers to the claimed conductor diameter. Bikson, ¶¶271-275. |
| **[2.c]** c. providing energy from the high-frequency generator to a balun transformer in order to convert an unbalanced radiofrequency | **Burnett-'870 teaches providing energy from the high-frequency generator** (*e.g.*, "energy generator") **to a radiofrequency electrode** (*e.g.*, an "electrode" applying "a RF field")**.**<br><br>*See* [2.pre]-[2.a]—**Burnett-'870** discloses an embodiment of its device comprising **conductive coils 212** and "microneedle **patch 228… having one or more electrodes** 232" in Fig. 12. |

| Claim Elements | Burnett-'870 in view of Park and Zarsky |
|---|---|
| signal to a balanced radiofrequency signal and providing the balanced radiofrequency signal to a transmatch in order to adjust an impedance of at least one radiofrequency electrode to correspond with an impedance of the biological structure of the patient; and |  <br>FIG. 12<br>Burnett-'870, [0135]; *id.*,[0075], [0116], [0139]–[0140], [0150], [0157]–[0160], Figs. 22-23. **Burnett-'870** incorporates by reference ([0002]) Burnett-'325 disclosing that "radio frequency-powered microstimulators that include electrodes" were known. Burnett-'325, [0022]. To the extent argued **Burnett-'870** does not explicitly discloses "a radiofrequency electrode," **Zarsky** further discloses "electrodes 6" that apply "radio frequency" to a patient's skin and tissues. Zarsky, Fig. 1, [0024], [0026], [0014], cls. 1–10. In view of the teachings from **Park** ([0005], [0029], [0036]) for the benefits of combination treatment**,** POSITAs would have been motivated and found it obvious to modify **Burnett-'870**'s device to apply **Zarsky**'s teaching of a "radiofrequency electrode". *See* VIII.D.2.<br><br>**Burnett-'870** leaves it to POSITAs to determine the components for generating RF waves. To the extent argued **Burnett-'870** does not disclose a balun transformer and a transmatch, **Zarsky discloses providing energy from the high-frequency generator** (*e.g.*, "HF Generator 11") **to a balun transformer** (*e.g.*, "Balun Transformer 13") **in order** |

| Claim Elements | Burnett-'870 in view of Park and Zarsky |
|---|---|
| | **to convert an unbalanced radiofrequency signal to a balanced radiofrequency signal and providing the balanced radiofrequency signal to a transmatch** (*e.g.*, "Transmatch 12") **in order to adjust an impedance of a radiofrequency electrode to correspond with an impedance of the biological structure of the patient.**<br><br>Figure 1 of **Zarsky** shows that the "HF Generator 11" provides energy to "Balun Transformer 13," which "converts unbalanced impedance to balanced impedance." Zarsky, [0019], [0021]. Figure 1 further shows that the "Transmatch 12" is connected to the "Balun Transformer 13" and "generator control unit 14" for impedance matching to a target body structure, such as skin. Zarsky, [0019]–[0021]; *see also* '187, Fig. 6 (identical disclosure to Zarsky Fig. 1). Bikson, ¶¶276-282, 100-101.<br><br>  <br>FIG. 1 |
| **[2.d]** d. generating radiofrequency waves with a frequency in a range of 1 MHz to 900 GHz and with | **Burnett-'870 in view of Park and Zarsky teaches generating radiofrequency waves with a frequency in a range of 1 MHz to 900 GHz** (*e.g.*, "13.56 or 40.68 or 27.12 MHz, or 2.45 GHz") **and with energy up to 400 W** (*e.g.*, "30–400 W") **by the at least one radiofrequency electrode** (*e.g.*, an "electrode" applying "a RF field")**.** |

| Claim Elements | Burnett-'870 in view of Park and Zarsky |
|---|---|
| energy up to 400 W by the at least one radiofrequency electrode; | *See* [2.pre]–[2.a], [2.c].<br><br>To the extent argued **Burnett-'870** does not explicitly disclose a specific frequency range and RF energy, **Zarsky** discloses its "electrodes 6" apply radio frequency at "13.56 or 40.68 or 27.12 MHz, or 2.45 GHz" with a power range is 30-400 W per pulse." Zarsky, [0015], [0019], [0026]-[0027], cls. 4, 10. POSITAs would have been motivated and found it obvious to apply RF waves at the specified frequency with energy of "30-400 W" as taught by Zarsky to provide effective "remodeling and downsizing subcutaneous lipid-rich cells, body contouring and skin tightening," which is also the objective in **Burnett-'870** to provide skin treatment. Zarsky, [0001]; Burnett-'870, [0043], [0118]–[0119], [0133], [0148]. *See* VIII.D.2. Bikson, ¶¶283-285, 72-75. |
| **[2.e]** e. applying the radiofrequency waves simultaneously with the time-varying magnetic field to the patient; and | **Burnett-'870 in view of Park and Zarsky teaches applying the radiofrequency waves simultaneously with the time-varying magnetic field to the patient.**<br><br>*See* [2.pre]-[2.d]—**Burnett-'870** discloses multiple applicators comprising coils that may be "activated simultaneously." Burnett-'870, [0086]–[0087]. Figure 12 shows that coils and electrode apply stimulation simultaneously.<br><br>To the extent argued **Burnett-'870** does not explicitly disclose applying the radiofrequency waves simultaneously with the time-varying magnetic field to the patient, **Park** discloses applying a combination of pulsed electromagnetic field and heat energy, such as RF, for "firming and toning of skin and muscles." Park, *Abstract*, [0004], [0007], [0027], [0029], [0036]. For example, **Park** discloses a device "capable of delivering at least two different types of energy simultaneously to target areas of the user's body." Park, [0031], Fig. 5A–D. In view of the teachings from **Park** ([0005], [0029], [0036]) for the benefits of combination treatment**,** POSITAs would have been motivated and found it |

| Claim Elements | Burnett-'870 in view of Park and Zarsky |
|---|---|
| | obvious to modify **Burnett-'870**'s device to apply **Zarsky**'s teaching of a RF circuit and electrodes such that both magnetic field and RF are applied simultaneously to a patient, which would reduce the total treatment time, and provide synergistic effects compared to separate treatments. *See* VIII.D.2. Bikson, ¶¶286-289, 72-75. |
| **[2.f]** f. remodeling a target biological structure by simultaneous heating the biological structure and contracting a muscle of a target body area. | **Burnett-'870 in view of Park and Zarsky teaches remodeling a target biological structure by simultaneous heating the biological structure** (*e.g.,* muscle, skin) **and contracting a muscle of a target body area** (*e.g.,* abdomen/buttocks)**.**<br><br>*See* [2.a], [2.e]—**Burnett-'870** applies magnetic stimulation causing muscles in abdomen or buttocks to contract, thereby remodeling and toning them. Burnett-'870, [0011], [0227]; **Zarsky** discloses using RF for "controlled heating of the targeted areas on the human body," thereby remodeling the tissues. **Zarsky**, *Abstract*, [0001], [0007]–[0008], [0012], [0016]–[0019], cl. 1 ("heating of the subcutaneous tissue"). Bikson, ¶¶290-292, 43-75. |
| | |
| **[10.pre]** A method for treatment of a biological structure of a patient by a time-varying magnetic field and radiofrequency waves, comprising: | *See* [2.pre]. Bikson, ¶¶293-294. |
| **[10.a]** a. providing energy from an energy source to an energy storage device and/or to a | *See* [2.a]. Bikson, ¶¶295-296. |

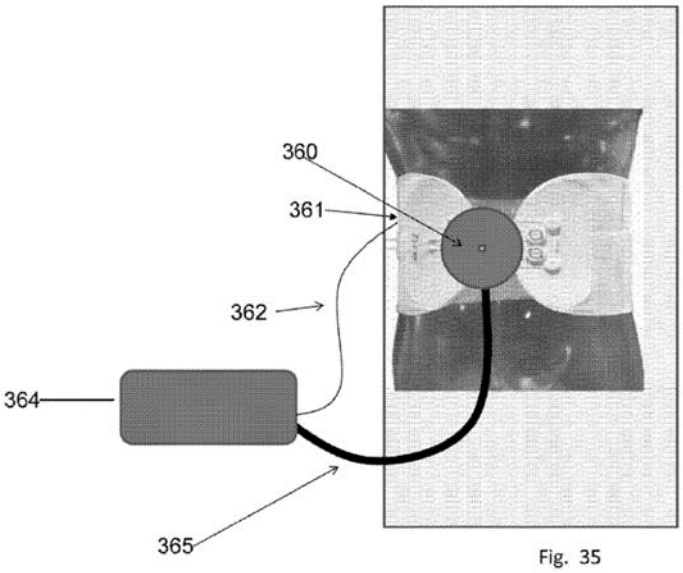
| Claim Elements | Burnett-'870 in view of Park and Zarsky |
|---|---|
| high-frequency generator; | |
| **[10.b]** b. providing energy from the energy storage device to a magnetic field generating device in order to generate the time-varying magnetic field; | *See* [2.b]. Bikson, ¶¶297-298. |
| **[10.c]** c. applying the time-varying magnetic field to the patient; | **Burnett-'870 discloses applying the time-varying magnetic field to the patient.**<br><br>*See* [2.pre]. Bikson, ¶¶299-300. |
| **[10.d]** d. providing energy from the high-frequency generator to a transmatch in order to adjust an impedance of a radiofrequency electrode to correspond with an impedance of a biological structure of the patient; | **Burnett-'870 in view of Park and Zarsky teaches providing energy from the high-frequency generator** (*e.g.*, "HF Generator 11" of Zarsky) **to a transmatch** (*e.g.*, "Transmatch 12" of Zarsky) **in order to adjust an impedance of a radiofrequency electrode** ("electrodes 6" of Zarsky) **to correspond with an impedance of a biological structure** (*e.g.,* skin, muscle) **of the patient.**<br><br>*See* [2.pre]–[2.a], [2.c]. Bikson, ¶¶301-302, 100-101. |
| **[10.e]** e. generating the radiofrequency waves by the radiofrequency electrode with a frequency of at | **Burnett-'870 in view of Park and Zarsky teaches generating the radiofrequency waves by the radiofrequency electrode** ("electrodes 6" of Zarsky) **with a frequency of at least 1 MHz** (*e.g.*, "13.56 or 40.68 or 27.12 MHz, or 2.45 GHz")**, and applying the radiofrequency waves to the patient.** |

| Claim Elements | Burnett-'870 in view of Park and Zarsky |
|---|---|
| least 1 MHz; applying the radiofrequency waves to the patient; and | *See* [2.pre]–[2.a], [2.c]–[2.e]. Bikson, ¶¶303-304. |
| **[10.f]** f. heating the biological structure by the radiofrequency waves. | **Burnett-'870 in view of Park and Zarsky teaches heating** (*e.g.*, "heating" in Zarsky) **the biological structure** (*e.g.*, "muscle," "subcutaneous tissue" of Zarsky) **by the radiofrequency waves.**<br><br>*See* [2.pre]–[2.a], [2.c]–[2.f]. Bikson, ¶¶305-306. |

### b. Dependent Claims 3-9, 11-18

| Claim Elements | Burnett-'870 in view of Park and Zarsky |
|---|---|
| **[3]** The method of claim 2 wherein the magnetic field generating device includes a litz-wire. | **Burnett-'870 teaches the magnetic field generating device** (*e.g.*, "applicator" comprising "coils") **includes a litz wire.**<br><br>*See* [2.pre], [2.b]—**Burnett-'870** leaves it to POSITAs to choose a conductor material for the coils, and using litz wires in coils for generating magnetic fields was known and conventional in the art to prevent high coil resistance causing electrical loss and significant heat generation "leading to danger of burn." *See, e.g.*, Ishikawa, *Abstract*, [0005]-[0006], [0039], [0046] ("the conductor portion 2 including bare wire 1 of the litz wire coil 6"). A POSITA would have been motivated to use litz wire in **Burnett-'870's** coil to prevent "burn," which is a safety concern expressed in **Burnett-'870.** Ishikawa, [0006]; **Burnett-'870**, [0119], [0235]. Bikson, ¶¶307-309. |
| **[4]** The method of claim 2 wherein a voltage drop between two successive peak amplitudes output from the energy | **Burnett-'870 teaches a voltage drop between successive peak amplitudes in the energy storage device** (*e.g.*, "capacitor") **is up to 21%.**<br><br>*See* [2.pre]–[2.b]— To the extent argued **Burnett-'870** does not explicitly disclose a certain voltage drop up to 21%, POSITAs would have been motivated and found it obvious to |

| Claim Elements | Burnett-'870 in view of Park and Zarsky |
|---|---|
| storage device is not higher than 21%. | operate **Burnett-'870**'s device with a constant voltage, or a voltage drop between successive peak amplitudes up to 21%, to minimize the capacitor's charge time in repetitive discharge timing applications, increase repetition rate by recharging the energy storage during a previous pulse, and to still deliver a therapeutic amplitude as desired by the patient, as was well-known and conventional in the art. *See, e.g.*, Polson, 3:38–40 ("voltage…on the discharge capacitor is about 80% of its initial magnitude"); 1:37–54 (describing "replenish[ing] the charge" on a discharge capacitor such that "rate of discharge pulses" is increased); '187, 6:66–7:3 (similarly to Polson, a small voltage drop allows for "increase [in]…repetition rate" because energy storage device is recharged during previous pulse). Bikson, ¶97-99.<br><br>POSITAs would have been motivated and found it obvious to operate **Burnett-'870** so that a voltage drop between the capacitor's successive peak amplitudes is up to 21%, such that repetition rate may be increased by charging capacitors during the prior pulse, and to minimize any drop in the magnetic field's flux density during patient treatment. Bikson, ¶¶310-313. |
| **[5]** The method of claim 2 wherein the energy storage device is in a serial connection with the magnetic field generating device. | **Burnett-'870 teaches the energy storage device** (*e.g.*, "capacitor") **is in a serial connection with the magnetic field generating device** (*e.g.*, "applicator" comprising "coils")**.**<br><br>**Burnett-'870** leaves it to POSITAs to choose an arrangement of a capacitor and coil, it was known and conventional in the art that they are connected "in series or in parallel" depending on circuit design and application. *See, e.g.*, Simon, [0019], [0055] ("coils, each of which is connected in series or in parallel to the impulse generator" that contains a capacitor). POSITAs would have been motivated and found it obvious to serially-connect the capacitor the coil in order to have constant current through the circuit. Bikson, ¶¶314-315. |

| Claim Elements | Burnett-'870 in view of Park and Zarsky |
|---|---|
| **[6]** The method of claim 2 further comprising directing a cooling media in a direction parallel to the magnetic field generating device. | **Burnett-'870 teaches directing a cooling media** (*e.g.*, "air," "liquid") **in a direction parallel to the magnetic field generating device** (*e.g.*, "applicator" comprising "coils")**.**<br><br>**Burnett-'870** discloses a conduit through "coil power line 365" to direct "fluid" such as "air" or "liquid," "rapid[ly]" to coils positioned in "applicator 360," and "[d]rawing air or other fluid through the coil" in Figure 35. Burnett-'870, [0010], [0210], [0215], [0235].<br>  <br><br>Fig. 35<br><br>POSITAs would have understood **Burnett-'870** directs a cooling fluid in a direction parallel to the coils because the fluid line goes alongside with and into the coils such that the cooling fluid flows through the coils to maximize surface area and time contacting the coils to efficiently dissipate heat. *See*, '187, Fig. 2 (fluid flows alongside the coils as indicated by the arrows). Bikson, ¶316-318, 86-90. |
| **[7]** The method of claim 2 further comprising directing a cooling media over at least upper and lower sides of the | **Burnett-'870 teaches directing a cooling media** (*e.g.*, "air," "liquid") **over at least upper and lower sides of the magnetic field generating device** (*e.g.*, "applicator" comprising "coils")**.**<br><br>*See* [6]—POSITAs would have understood **Burnett-'870's** "[d]rawing air or other fluid through the coil" describes the claimed directing a cooling media over at least upper and |

| Claim Elements | Burnett-'870 in view of Park and Zarsky |
|---|---|
| magnetic field generating device. | lower sides of the magnetic field generating device. Burnett-'870, [0235]. To the extent argued that **Burnett-'870** does not expressly disclose flowing coolant over the upper and lower sides, POSITAs would have been motivated and found it obvious to direct cooling media over all sides of the coil, which includes upper and lower sides to maximize surface area and time contacting the coils to efficiently dissipate heat. Bikson, ¶¶319-321, 86-90. |
| **[8]** The method of claim 2 with the magnetic field generating device including a blower for directing a cooling media and wherein the blower is on a circumference of the magnetic field generating device. | **Burnett-'870 teaches directing a cooling media by a blower on a circumference of the magnetic field generating device** (*e.g.*, "applicator" comprising "coils")**.**<br><br>*See* [6]—**Burnett-'870** discloses "air" cooling technique, such as "rapid airflow to cool the coils," which would encompass the coil circumference. Burnett-'870, [0210], [0215]. **Burnett-'870** leaves it to POSITAs to choose the mechanism to move coolant air, and the use of an air blower to move air is well known and conventional in a magnetic field generation device. *See, e.g.*, Ghiron, 1:57–60 ("Conventional cooling solutions typically involve the use of…air cooling mechanism [that] may involve a fan that rapidly circulates cooled or room temperature air past the magnetic device."). POSITAs would have been motivated and found it obvious to use an air blower in **Burnett-'870**'s device to generate a "rapid airflow" through the coils. Bikson, ¶¶322-324. |
| **[9]** The method of claim 2 further comprising operating the device including the magnetic field generating device in order to maintain a temperature of a casing of the magnetic field | **Burnett-'870 teaches operating a treatment device including the magnetic field generating device** (*e.g.*, "applicator" comprising "coils") **to maintain a temperature of a casing** (*e.g.*, "housing") **of the magnetic field generating device up to 43° C.**<br><br>*See* [2.pre], [6]–[8].<br><br>**Burnett-'870** discloses "one or more conductive coils disposed in an ergonomic housing," *e.g.*, "wrap"/"cradle"/"garment." Burnett-'870, [0070], [0074]. |

| Claim Elements | Burnett-'870 in view of Park and Zarsky |
|---|---|
| generating device up to 43° C. | **Burnett-'870** discloses cooling techniques to avoid "exposing the patient to excessive temperatures" of its "cradle device." Burnett-'870, [0235], [0196], [0208] ("overheating"). **Burnett-'870** leaves it to POSITAs to choose a temperature to maintain the casing of its device that would not be "excessive" or cause "overheating" and POSITAs would have been motivated and found it obvious to maintain the housing temperature at less than 43°C for safety, compliance with FDA guidelines, and patient comfort. *See, e.g.,* Ghiron, 1:22–33 ("the temperature of a magnetic stimulation device used to generate a therapeutic magnetic field should be kept below approximately 41.5° C. to stay within certain regulatory requirements (e.g., FDA guidelines)."). Bikson, ¶¶325-328. |
| | |
| **[11]** The method of claim 10 wherein the magnetic field generating device includes a litz-wire having a conductor diameter less than 3 mm. | **Burnett-'870 teaches the magnetic field generating device** (*e.g.*, "applicator" comprising "coils") **includes a litz wire having a conductor diameter less than 3 mm.**<br><br>*See* [2.b], [3]. Bikson, ¶¶329-330. |
| **[12]** The method of claim 10 wherein a voltage drop between two successive peak amplitudes output from the energy storage device is not higher than 21%. | *See* [4]. Bikson, ¶¶331-332. |
| **[13]** The method of claim 10 wherein the | *See* [5]. Bikson, ¶¶333-334. |

| Claim Elements | Burnett-'870 in view of Park and Zarsky |
|---|---|
| energy storage device is in a serial connection with the magnetic field generating device. | |
| **[14.pre]** The method of claim 10 wherein the magnetic field generating device includes a litz-wire, | **Burnett-'870 teaches the magnetic field generating device** (*e.g.*, "applicator" comprising "coils") **includes a litz wire.**<br><br>*See* [3]. Bikson, ¶¶335-336. |
| **[14.a]** further comprising providing energy from the high-frequency generator to a balun transformer in order to convert an unbalanced radiofrequency signal to a balanced radiofrequency signal. | **Burnett-'870 in view of Park and Zarsky teaches providing energy from the high-frequency generator** (*e.g.*, "HF Generator 11" of Zarsky) **to a balun transformer** (*e.g.*, "Balun Transformer 13") **in order to convert an unbalanced radiofrequency signal to a balanced radiofrequency signal.**<br><br>*See* [2.pre]–[2.a], [2.c]. Bikson, ¶¶337-338. |
| **[15]** The method of claim 10 further comprising directing a cooling media in a direction parallel to the magnetic field generating device. | *See* [6]. Bikson, ¶¶339-340. |
| **[16]** The method of claim 10 further | *See* [7]. Bikson, ¶¶341-342. |

| Claim Elements | Burnett-'870 in view of Park and Zarsky |
|---|---|
| comprising directing a cooling media over at least upper and lower sides of the magnetic field generating device. | |
| **[17]** The method of claim 10 further comprising directing a cooling media on a circumference of the magnetic field generating device. | *See* [8]. Bikson, ¶¶343-344. |
| **[18]** The method of claim 10 further comprising operating a treatment device including the magnetic field generating device in order to maintain a temperature of a casing of the magnetic field generating device up to 43° C. | *See* [9]. Bikson, ¶¶345-346. |

## IX. SECONDARY CONSIDERATIONS

Petitioner is unaware of evidence of secondary considerations relevant to the Challenged Claims at the date of this filing. Bikson, ¶348.

## X. CONCLUSION

Petitioner respectfully requests IPR of Claims 2-18 of the '187. Bikson, ¶¶349-351.

Dated: September 13, 2021

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## CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. §42.24(a) and (d), the undersigned hereby certify that the Petition For *Inter Partes* Review complies with the type-volume limitation of 37 C.F.R. §42.24(a)(i) because, exclusive of the exempted portions, it contains 13,925 words as counted by the word processing program used to prepare the paper.

Dated: September 13, 2021

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## CERTIFICATE OF SERVICE

The undersigned certifies service pursuant to 37 C.F.R. §§42.6(e) and 42.105(b) on the Patent Owner by FedEx of a copy of this Petition for Inter Partes Review and supporting materials at the correspondence address of record for the '187 patent:

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