By: Thomas F. Finch (t.finch@pkhip.com) Kenneth A. Knox (k.knox@pkhip.com) Jason M. Perilla (j.perilla@pkhip.com) **PERILLA KNOX & HILDEBRANDT LLP** 5871 Glenridge Drive Suite 350 Atlanta, Georgia 30328-5376 Tel: (770) 927-7802 Fax: (877) 389-6779

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ALMENDRA PTE. LTD.

Petitioner,

v.

FIENILE ACGRONECÓCIOS LTDA.

Patent Owner.

Case No. PGR2025-00055

U.S. Patent No. 12,089,543 B2

PETITION FOR POST-GRANT REVIEW

TABLE OF CONTENTS

Tabl	le of Contents i
Tabl	le of Authoritiesvi
Exh	ibit Listx
Glos	ssary of Termsxi
List	of Challenged Claims xii
<i>I</i> .	Introduction1
II.	Mandatory Notices Under 37 C.F.R. § 42.82
А	. Real Party-In-Interest Under 37 C.F.R. § 42.8(b)(1
В	. Related Matters Under 37 C.F.R. § 42.8(b)(2
С	. Lead and Back-Up Counsel Under 37 C.F.R. § 42.8(b)(3)2
D	Service Information Under 37 C.F.R. § 42.8(b)(4
III.	Payment of Fees Under 37 C.F.R. § 42.203
IV.	Requirements for Post-Grant Review Under 37 C.F.R. § 42.2044
А	. Grounds for standing under 37 C.F.R. § 42.204(a)4
В	. Identification of challenge and relief requested (37 C.F.R. § 42.204(b) and
3′	7 C.F.R. § 42.22)
	1. Claims for which post-grant review is requested under 37 C.F.R. §
	42.204(b)(1)4
	2. The specific statutory grounds on which the challenge is based under 37
	C.F.R. § 42.204(b)(2)
	3. How the Challenged Claims are to be construed under 37 C.F.R. §
	42.204(b)(3)
	4. How the construed claims are unpatentable under 37 C.F.R. §
	42.204(b)(4)
	5. Supporting evidence under 37 C.F.R. § 42.204(b)(55

A. art.	Modular agricultural irrigation pivot-like devices were well-known in the
B. well	Use of artificial lighting to aid in cultivation of a crop species in a field is known10
C.	Agricultural management methods were well known in the art11
VI.	U.S. Patent No. 12,089,543
А.	Person of Ordinary Skill in the Art
B.	The '543 Patent's Prosecution History
C.	The '543 Patent's Claims
1.	Agricultural Management Method15
2.	Agricultural Management System
VII.	The Prior Art19
А.	U.S. Patent Pub. No. 2019/0098843 ("Rosen")19
В.	U.S. Patent Pub. No. 2021/0185945 ("Richardville")20
VIII. 35 U.S	Ground 1: Claims 1-7 of the '543 Patent are Invalid as Indefinite under S.C. §112
A. struc 1. d, (1 2.	The '543 Patent does not inform a POSITA about the scope of certain ctural elements with reasonable certainty
B. limi	Claims 1-7 of the '543 Patent are indefinite due to use of subjective catchall tations
C. basi	Claim 7's references to "the artificial intelligence model" lack antecedent s and are therefore indefinite
D. proc	Claims 1-7 of the '543 Patent are indefinite due to their use of unintelligible cess limitations

IX.	Ground 2: Claims 1-7 of the '543 Patent are Invalid as Not Enabled
unde	r 35 U.S.C. § 112
A.	Nature of Invention and Quantity of Experimentation (Factors 1, 4)35
В.	No Guidance or Examples Provided (Factors 2, 3)
C.	The Breadth of the Claims (Factor 8)
D.	Conclusion
X. §101	Ground 3: Claims 1-7 of the '543 Patent are ineligible under 35 U.S.C. because they are directed to ineligible subject matter
A. wit	The Challenged Claims are directed to the abstract idea of providing plants th light, water, and soil to encourage growth
В.	The Challenged Claims lack an inventive concept
C. pat	The '543 Patent's reference to "artificial intelligence" does not render it cent-eligible
<i>XI.</i>	Ground 4: Claims 1-7 of the '543 Patent are obvious under 35 U.S.C. §
103 0	over Rosen41
A.	Claim 1:
1	 1.A: a modular agricultural irrigation pivot-like device (101) positioned on an agricultural field (200) in the cultivation of a crop (202 a) species, the modular agricultural irrigation pivot-like device (101) comprising:43 1.B: the agricultural management system (100) further comprising:50
B. a) a	Claim 2: SYSTEM (100), according to claim 1, characterized in that stages and b) determined by the processor using an artificial intelligence model62
C.	Claim 3:
1	 3.Pre: SYSTEM (100), according to claim 1, characterized in that the modular agricultural irrigation pivot-like device (101) comprises:
]	 irrigation device (101) over the agricultural field (200); and

3.C: wherein the processor is in communication with the drive device 4. and with the sprinkler device for the execution of stage b)......67 D. 4.Pre: AGRICULTURAL MANAGEMENT METHOD (500), for the 1. cultivation of a crop (202 a) in an agricultural field (200), characterized by 4.A: a) adjusting (501), in intervals of the electromagnetic spectrum, the 2. balance between the spectral bands emitted by a plurality of light-emitting diodes of a plurality of artificial lighting sources (10 a, 10 b, 10 c, 10 d, 10 e); and 69 4.B: b) determining and implementing: an irrigation routine (502) of a 3. modular agricultural irrigation device (101); and/or a routine of artificial light(s) supplementation (503) of the plurality of artificial lighting sources (10 a, 10 b, 10 c, 10 d, 10 e);.....70 4.C: wherein stages a) and b) are determined considering at least one 4. among: a crop (202 a) species under cultivation; a phenological stage of the crop (202 a) under cultivation; a season, a photoperiod, and current weather conditions under which the agricultural field (200) is subjected; and one or more objective(s) intended for the crop (202) development.70 Claim 5: METHOD (500), according to claim 4, characterized in that stages E. a) and b) are determined by the processor using an artificial intelligence model... F. Claim 6: METHOD (500), according to claim 4, is characterized by further comprising a stage c) of determining a routine of soil management in the agricultural field (200) based on soil analyses from the agricultural field G. Claim 7: METHOD (500), according to claim 6, characterized in that stage c) of determining through the artificial intelligence model considers at least one of the following: the irrigation routine (502); the routine of artificial light(s) supplementation (503); the crop (202 a) species under cultivation; the

phenological stage of the crop (202 a) under cultivation; the photoperiod, the season and the current weather conditions under which the agricultural field

(200) is subjected; and the one or more objective(s) intended for the crop (202 a) development
XII. Ground 5: Claims 1-7 of the '543 Patent are obvious under 35 U.S.C. § 103 over Richardville in view of Rosen
A. Motivation to Combine79
B. Claim 1:
 1. 1.Pre: AGRICULTURAL MANAGEMENT SYSTEM (100) is characterized by comprising:
C. Claim 2: SYSTEM (100), according to claim 1, characterized in that stages a) and b) determined by the processor using an artificial intelligence model87
D. Claim 3:
 3.Pre: SYSTEM (100), according to claim 1, characterized in that the modular agricultural irrigation pivot-like device (101) comprises:
irrigation device (101) over the agricultural field (200); and
3. 3.B: sprinkler devices comprising a plurality of sprinklers,
and with the sprinkler device for the execution of stage b)
E. Claims 4-7
XIII. Conclusion
Certificate of Service
Certificate of Word Count

TABLE OF AUTHORITIES

CASES

Alcon Research Ltd. v. Barr Labs., Inc.,	
745 F.3d 1180 (Fed. Cir. 2014)	
Alice Corp. Pty. Ltd. v. CLS Bank Int'l,	
573 U.S. 208 (2014)	
Amgen Inc. v. Sanofi,	
598 U.S. 594 (2023)	
Amgen Inc. v. Sanofi,	
987 F.3d 1080 (Fed. Cir. 2021)	
BASCOM Glob. Internet Servs. v. AT&T Mobility LLC,	
827 F.3d 1341 (Fed. Cir. 2016)	
Bicon, Inc. v. Straumann Co.,	
441 F.3d 945 (Fed. Cir. 2006)	25
Cochlear Bone Anchored Sols. AB v. Oticon Med. AB,	
958 F.3d 1348 (Fed. Cir. 2020)	
Crown Operations Int'l v. Solutia Inc.,	
289 F.3d at 1367 (Fed. Cir. 2002)	
Datamize, LLC v. Plumtree Software, Inc.,	
417 F.3d 1342 (Fed. Cir. 2005)	
Enzo Biochem, Inc. v. Applera Corp.,	
599 F.3d 1325 (Fed. Cir. 2010)	
Enzo Biochem, Inc. v. Calgene, Inc.,	
188 F.3d 1362 (Fed. Cir. 1999)	
188 F.3d 1362 (Fed. Cir. 1999)	

FairWarning IP, LLC v. Iatric Sys., Inc.,
839 F.3d 1089 (Fed. Cir. 2016)
Genentech, Inc. v. Novo Nordisk A/S,
108 F.3d 1361 (Fed. Cir. 1997)
Halliburton Energy Servs., Inc. v. M-I LLC,
514 F.3d 1244 (Fed. Cir. 2008)22
In re BRCA1- & BRCA2-Based Hereditary Cancer Test Patent Litig,
774 F.3d 755 (Fed. Cir. 2014)
In re Downing,
754 F. App'x 988 (Fed. Cir. 2018)
In re Packard,
751 F.3d 1307 (Fed. Cir. 2014)
In re Wands,
858 F.2d 731 (Fed. Cir. 1988)
Indacon, Inc. v. Facebook, Inc.,
824 F.3d 1352 (Fed. Cir. 2016)26
Intellectual Ventures I LLC v. Capital One Bank (USA),
792 F.3d 1363 (Fed. Cir. 2015)40
Intellectual Ventures I LLC v. T-Mobile USA, Inc.,
902 F.3d 1372 (Fed. Cir. 2018)
Intellectual Ventures I, LLC v. Canon Inc.,
No. 13-473-SLR, 2015 U.S. Dist. LEXIS 38910 (D. Del. Mar. 27, 2015)
Interval Licensing LLC v. AOL, Inc.,
766 F.3d 1364 (Fed. Cir. 2014)21
Irdeto Access, Inc. v. Echostar Satellite Corp.,
383 F.3d 1295 (Fed. Cir. 2004)27

Iridescent Networks, Inc. v. AT&T Mobility, LLC,	
933 F.3d 1345 (Fed. Cir. 2019)	
MagSil Corp. v. Hitachi Glob. Storage Techs., Inc.,	
687 F.3d 1377 (Fed. Cir. 2012)	
Mayo Collaborative Servs. v. Prometheus Labs., Inc.,	
566 U.S. 66 (2012)	
Nat'l Recovery Techs., Inc. v. Magnetic Separation Sys.,	
166 F.3d 1190 (Fed. Cir. 1999)	
Nautilus, Inc. v. Biosig Instruments, Inc.,	
572 U.S. 898 (2014)	
Nautilus, Inc. v. Biosig Instruments, Inc.,	
572 U.S. 901 (2014)	
Niazi Licensing Corp. v. St. Jude Med. S.C., Inc.,	
30 F.4th 1339 (Fed. Cir. 2022)	
Recentive Analytics, Inc. v. Fox Corp.,	
134 F.4th 1205 (Fed. Cir. 2025)	
SIBIA Neurosciences, Inc. v. Cadus Pharm. Corp.,	
225 F.3d 1349 (Fed. Cir. 2000)	
Skyhook Wireless, Inc. v. Google, Inc.,	
159 F. Supp. 3d 144 (D. Mass. 2015)	
Soverain Software LLC v. Newegg Inc.,	
728 F.3d 1332 (Fed. Cir. 2013)	
Wasica Fin. GmbH v. Cont'l Automotive Systems, Inc.,	
853 F.3d 1272 (Fed. Cir. 2017)	
Wyeth & Cordis Corp. v. Abbott Labs.,	
720 F.3d 1380 (Fed. Cir. 2013)	

STATUTES

35 U.S.C. § 101	
35 U.S.C. § 102	
35 U.S.C. § 103	
35 U.S.C. § 112	
35 U.S.C. § 321	1

RULES

37	C.F.R.	§ 42.200	 	 	1
• •		3	 	 	

EXHIBIT LIST

Exhibit	Description
1001	U.S. Patent No. 12,089,543
1002	File History of U.S. Patent No. 12,089,543
1003	Declaration of Dr. John Long
1004	Curriculum Vitae of Dr. John Long
1005	U.S. Patent Pub. No. 2019/0098843 ("Rosen")
1006	U.S. Patent Pub. No. 2016/0198640 ("Singh")
1007	U.S. Patent Pub. No. 2021/0185945 ("Richardville")
1008	U.S. Patent No. 4,336,908 ("Vikre")
1009	U.S. Patent No. 3,797,517 ("Kircher")
1010	U.S. Patent No. 3,930,335 ("Widmayer")
1011	U.S. Patent No. 4,209,131 ("Barash")
1012	U.S. Patent No. 2,604,359 ("Zybach")

GLOSSARY OF TERMS

Term	Description
The '543 Patent	U.S. Patent No. 12,089,543
Board	Patent Trial and Appeal Board
Challenged Claims	Claims 1-7 of the '543 Patent.
Patent Owner	Fienile Agronegocios LTDA
Petitioner	Almendra Pte. Ltd.
Richardville	U.S. Patent Pub. No. 2021/0185945
Rosen	U.S. Patent Pub. No. 2019/0098843
Singh	U.S. Patent Pub. No. 2016/0198640
USPTO	United States Patent and Trademark Office

LIST OF CHALLENGED CLAIMS

#	Claim
1.Pre	1. AGRICULTURAL MANAGEMENT SYSTEM (100) is characterized by comprising:
1.A	a modular agricultural irrigation pivot-like device (101) positioned on an agricultural field (200) in the cultivation of a crop (202 a) species, the modular agricultural irrigation pivot-like device (101) comprising:
1.A.i	a plurality of artificial lighting sources (10 a, 10 b, 10 c, 10 d, 10 e) arranged along the modular agricultural irrigation pivot-like device (101) at a predetermined distance above the aerial parts of the crop (202 a), comprising a plurality of light-emitting diodes; and
1.A.ii	a plurality of energy sources that feed the plurality of artificial lighting sources (10 a, 10 b, 10 c, 10 d, 10 e),
1.B	the agricultural management system (100) further comprising:
1.B.i	a processor in communication with a dimerizer and/or a polarizer of the plurality of artificial lighting sources (10 a, 10 b, 10 c, 10 d, 10 e) and with the plurality of energy sources, wherein the processor is configured to:
1.B.ii	a) adjust (501), in the intervals of the electromagnetic spectrum, the balance between the spectral bands emitted by the plurality of light-emitting diodes; and
1.B.iii	b) determine and implement:
	an irrigation routine (502); and/or
	an artificial light(s) supplementation routine (503);

#	Claim
1.B.iv	wherein stages a) and b) are determined by the processor considering at least one among:
	a crop (202 a) species under cultivation;
	a phenological stage of the crop (202 a) under cultivation;
	a photoperiod, a season and current weather conditions under which the agricultural field (200) is subjected; and
	one or more objective(s) intended for the crop (202 a) development.
2	SYSTEM (100), according to claim 1, characterized in that stages a) and b) determined by the processor using an artificial intelligence model.
3.Pre	SYSTEM (100), according to claim 1, characterized in that the modular agricultural irrigation pivot-like device (101) comprises:
3.A	a drive device for the displacement of the modular agricultural irrigation device (101) over the agricultural field (200); and
3.B	sprinkler devices comprising a plurality of sprinklers,
3.C	wherein the processor is in communication with the drive device and with the sprinkler device for the execution of stage b).
4.Pre	4. AGRICULTURAL MANAGEMENT METHOD (500), for the cultivation of a crop (202 a) in an agricultural field (200), characterized by comprising the steps of:
4.A	a) adjusting (501), in intervals of the electromagnetic spectrum, the balance between the spectral bands emitted by a plurality of light- emitting diodes of a plurality of artificial lighting sources (10 a, 10 b, 10 c, 10 d, 10 e); and

#	Claim
4.B	b) determining and implementing:
	an irrigation routine (502) of a modular agricultural irrigation device (101); and/or
	a routine of artificial light(s) supplementation (503) of the plurality of artificial lighting sources (10 a, 10 b, 10 c, 10 d, 10 e);
4.C	wherein stages a) and b) are determined considering at least one among:
	a crop (202 a) species under cultivation;
	a phenological stage of the crop (202 a) under cultivation;
	a season, a photoperiod, and current weather conditions under which the agricultural field (200) is subjected; and
	one or more objective(s) intended for the crop (202) development.
5	METHOD (500), according to claim 4, characterized in that stages a) and b) are determined by the processor using an artificial intelligence model.
6	METHOD (500), according to claim 4, is characterized by further comprising a stage c) of determining a routine of soil management in the agricultural field (200) based on soil analyses from the agricultural field (200).

#	Claim	
7	METHOD (500), according to claim 6, characterized in that stage c) determining through the artificial intelligence model considers at lea one of the following:	
	the irrigation routine (502);	
	the routine of artificial light(s) supplementation (503);	
	the crop (202 a) species under cultivation;	
	the phenological stage of the crop (202 a) under cultivation;	
	the photoperiod, the season and the current weather conditions under which the agricultural field (200) is subjected; and	
	the one or more objective(s) intended for the crop (202 a) development.	

I. INTRODUCTION

Pursuant to 35 U.S.C. § 321 and 37 C.F.R. § 42.200, Petitioner Almendra Pte. Ltd. ("Almendra" or "Petitioner") requests post-grant review of Claims 1-7 of United States Patent No. 12,089,543 (the "'543 Patent") (EX1001), which is assigned on its face to Fienile Agronegocios LTDA ("Fienile" or "Patent Owner"). *First*, the '543 Patent is replete with amorphous structural limitations, subjective catchall language, unclear references to artificial intelligence lacking antecedent basis, and unintelligible process limitations, each of which render the Challenged Claims invalid as indefinite. Second, the '543 Patent broadly claims "determining" certain irrigation, artificial light supplementation, and soil management routines, but does not provide any guidance as to how a POSITA would have done so—effectively claiming the very concept of undue experimentation—and rendering the Challenged Claims invalid as not enabled. Third, the '543 Patent is directed to the abstract idea of providing plants with optimal light, water, and soil condition to facilitate growth, which renders the Challenged Claims invalid under 35 U.S.C. § 101 because they are directed to ineligible subject matter. *Finally*, the Challenged Claims are obvious over Rosen, either alone or in combination with Richardville.

Because of these shortcomings, it is more likely than not that at least one of the Challenged Claims is unpatentable and a trial for post-grant review should be instituted. This petition establishes that Claims 1-7 are unpatentable under 35 U.S.C. §§ 101, 103, and 112. Thus, Petitioner respectfully requests that Claims 1-7 be judged unpatentable and canceled.

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

As set forth below and pursuant to 37 C.F.R. § 42.8 (a)(1), the following mandatory notices are provided as part of this Petition:

A. Real Party-In-Interest Under 37 C.F.R. § 42.8(b)(1

The real parties-in-interest are Petitioner Almendra Pte. Ltd., a Singapore corporation having a principal place of business at 435 Orchard Road, #11-00 Wisma Atria, Singapore 238877, and Almendra Americas, LLC, a Georgia corporation having a principal place of business at 1 W Court Sq, Suite 750, Decatur, GA, 30030, United States of America. Almendra Americas, LLC is a wholly owned subsidiary of No other parties exercised or could have exercised control over this Petition, and no other parties funded or directed this Petition.

B. Related Matters Under 37 C.F.R. § 42.8(b)(2

Petitioner is not aware of any related matters pursuant to 37 C.F.R. § 42.8(b)(2).

C. Lead and Back-Up Counsel Under 37 C.F.R. § 42.8(b)(3)

Pursuant to 37 C.F.R. § 42.8(b)(3), Petitioner provides the following designation of counsel:

Lead Counsel	Backup Counsel
Thomas F. Finch (Reg. No. 82,341)	Kenneth A. Knox (Reg. No. 71,306)
PERILLA KNOX &	Jason M. Perilla (Reg. No. 65,731)
HILDEBRANDT LLP	PERILLA KNOX &
5871 Glenridge Drive	HILDEBRANDT LLP
Suite 350	5871 Glenridge Drive
Atlanta, Georgia 30328-5376	Suite 350
Tel: (770) 927-7802	Atlanta, Georgia 30328-5376
Fax: (877) 389-6779	Tel: (770) 927-7802
Email: t.finch@pkhip.com	Fax: (877) 389-6779
	Email: k.knox@pkhip.com
	Email: j.perilla@pkhip.com

Pursuant to 37 C.F.R. § 42.10(b), a Power of Attorney has been submitted.

D. Service Information Under 37 C.F.R. § 42.8(b)(4

Service on Petitioner may be made by mail or hand delivery to 5871 Glenridge Drive, Suite 350, Atlanta, Georgia 30328. The fax numbers for lead and backup counsel are shown above. Petitioner also consents to electronic service by email at t.finch@pkhip.com, k.knox@pkhip.com, and j.perilla@pkhip.com, with a copy to litigation@pkhip.com.

III. PAYMENT OF FEES UNDER 37 C.F.R. § 42.203

The undersigned authorizes the Office to charge fees specified by 37 C.F.R. § 42.15(b) to Deposit Account No. 60-4493. The undersigned further authorizes payment for any additional fees that might be due in connection with this Petition to be charged to the above referenced Deposit Account.

IV. REQUIREMENTS FOR POST-GRANT REVIEW UNDER 37 C.F.R. § 42.204

A. Grounds for standing under 37 C.F.R. § 42.204(a)

Petitioner certifies that the '543 Patent is available for post-grant review because (i) the '543 Patent is a first-to-file patent having an effective filing date of no earlier than October 16, 2015; and (ii) this petition is being filed within nine months of the patent's September 17, 2024 issue date.

Petitioner further certifies that it is not barred or estopped from requesting post-grant review challenging the claims of the '543 Patent on the grounds identified. Neither Petitioner, nor any party in privity with Petitioner: (i) has filed a civil action challenging the validity of the Challenged Claims; or (ii) is estopped from challenging the claims on the grounds identified in the petition. The Challenged Claims also have not been the subject of a prior post-grant review or a finally concluded district court litigation.

B. Identification of challenge and relief requested (37 C.F.R. § 42.204(b) and 37 C.F.R. § 42.22)

1. Claims for which post-grant review is requested under 37 C.F.R. § 42.204(b)(1)

Petitioner requests post-grant review of Claims 1-7 of the '543 Patent.

2. The specific statutory grounds on which the challenge is based under 37 C.F.R. § 42.204(b)(2)

The Challenged Claims are unpatentable for the following reasons:

- Claims 1-7 are unpatentable under 35 U.S.C. § 112(b) as indefinite (Ground 1);
- Claims 1-7 are unpatentable under 35 U.S.C. § 112(a) because they are not enabled (Ground 2);
- Claims 1-7 are unpatentable under 35 U.S.C. § 101 because they claim unpatentable subject matter (Ground 3);
- Claims 1-7 are obvious under 35 U.S.C. § 103 over Rosen (Ground 4); and
- Claims 1-7 are obvious under 35 U.S.C. § 103 over Richardville in view of Rosen (Ground 5).

3. How the Challenged Claims are to be construed under 37 C.F.R. § 42.204(b)(3)

The Challenged Claims are to be construed in accordance with their ordinary and customary meaning to a person of ordinary skill in the art at the relevant time and in light of the specification and the prosecution history.

4. How the construed claims are unpatentable under 37 C.F.R. § 42.204(b)(4)

A detailed explanation of why the Challenged Claims are unpatentable and the evidence in support is set forth in Sections VIII through XII, below.

5. Supporting evidence under 37 C.F.R. § 42.204(b)(5

A discussion of the evidence in support of why the Challenged Claims are

unpatentable, including an explanation of its relevance, is provided in Sections VIII through XII, below, and includes the attached exhibits and Declaration of Dr. John Long, Ph.D, P.E. (EX1003). A list identifying the exhibits appears above.

V. TECHNOLOGY OVERVIEW

"Large-scale agricultural production has always been closely linked to and dependent on multiple variables," including: (1) "the nutritional and microbiological factors of the soil," (2) intrinsic regional characteristics such as "climate, photoperiod, and rainfall distribution," and (3) "a plurality of stresses that affect crops" including pathogens, insect infestations, competitive weeds, and extreme deficiencies or excesses in light, water, and nutritional factors. EX1001, 1:26-34. A wide variety of agricultural management systems (both formal and informal) have been used throughout history in order to optimize plant growth. EX1003, ¶43.

For example, humans have long used fertilizer in order to enhance the nutritional and microbiological factors of the soil. Similarly, irrigation has been a mainstay of agriculture for thousands of years, and artificial lighting has long been used to supplement agricultural development. EX1003, ¶44.

The '543 Patent recognizes that in order to increase agricultural production, "advances have been made in studies on artificial light(s) supplementation for crop production outdoor (large scales), defined as the process of applying artificial light(s) to plants grown in the open field, emphasizing the beneficial effects of the use of light-emitting diodes (LEDs) on plant's metabolism, on the efficiency of light absorption by the leaves, as well as the mitigation of abiotic (e.g., extreme temperatures and drought) and biotic (e.g., insect pests, plant diseases, weeds) stresses, while applying a sustainable management of the available resources." EX1001, 2:11-21; EX1003, ¶45.

A. Modular agricultural irrigation pivot-like devices were well-known in the art.

Center-pivot irrigation systems are well established in the agricultural industry. These "systems typically comprise an extremely long water conduit 'arm,' which is pivotally connected at one end to a source of water under pressure. The conduit arm is carried in an elevated position, usually by a plurality of radially spaced wheeled towers powered by hydraulic, pneumatic or electrical motors to rotatably sweep the conduit arm through and over a circular field." EX1008, 1:16-27. Since as early as the 1950s, these "systems have strongly and successfully established themselves in the farming community. Although initially expensive, they presently represent one of the most efficient manners of irrigation, [e]nsuring that most of the crop receives an adequate supply of water and thus increasing crop yield." EX1008, 1:28-33; EX1012; EX1003, ¶¶46-47.

"Of the various types of sprinkler apparatus, it has been found that the selfpropelled, center pivot irrigation apparatus is the most effective type for irrigating

7

large sections of land economically and in a uniform manner. Self-propelled irrigation apparatus of the center pivot type comprises an elongated main arm assembly, usually including several sections connected at their ends, supported at intervals by self-propelling wheeled support towers. The main arm assembly supports, or may itself constitute, a fluid carrying conduit and includes a large number of sprinklers or nozzles spaced along its length." EX1009, 1:6-22; EX1003, ¶¶48-49. Examples of early irrigation pivots are depicted below:



EX1009, Figs. 4A, 4B.

A POSITA would have understood that irrigation pivots were typically implemented as modular devices to account for different agricultural environments.

EX1003, ¶50. For example, Richardville discloses a "center pivot type irrigation system" and a "lateral move type irrigation system," both of which include "one or more spans." EX1007, ¶¶[0014], [0019]. The one or more spans could be assembled to one another to account for differences in field size, terrain, or any other differences in the horticulture environment. Richardville's center pivot type irrigation system additionally includes "one or more drive units," and "one or more pivot legs," and is depicted below in Figure 1. EX1007, ¶[0014]. EX1003, ¶51.



FIG.1

B. Use of artificial lighting to aid in cultivation of a crop species in a field is well known.

"Light(s) supplementation applied to crops can alter plant responses significantly. However, these responses are affected by several factors, such as plant species, crop management, soil fertility, water availability, and the prevailing climate." EX1001, 2:33-37. As early as the 1970's, it was recognized that "[t]he use of artificial light sources as a substitute for, or a supplement to, the sun is becoming widely used by research scientists, commercial growers and hobbyists in the growing of plant life." EX1010, 1:12-29. At that time, benefits of adjusting the spectral balance among and between a plurality of light sources was already known. EX1010, 1:45-58 (disclosing methods and apparatuses for "utilizing an artificial lighting system for growing plants wherein predetermined bursts of radiant energy are supplied to the plant life of a duration, intensity and periodicity such that the photosynthesis process of the plant life is maintained"); EX1010, 6:8-33 ("where the growing beds to be irradiated are fields or large enclosures a large number of lamps would be used, the lamps being typically strung overhead every few inches"). EX1003, ¶¶52-53.

The '543 Patent recognizes one exemplary system, stating that:

Document US 2016/0198640 A1 reveals a mobile irrigation pivot equipped with sprinklers and a plurality of light-emitting diodes configured to emit different frequencies of polarized light in spectral bands from violet to far red spectrum over plants of short, long, or neutral photoperiod response in an agricultural field. The light-emitting diodes are fixed on the irrigation pivot structure, illustrated in FIG. 1 of the referred document.

EX1001, 2:22-29; EX1003, ¶54. Similarly, Richardville also discloses an "illuminated irrigation system 300 shown in FIG. 3 [that] includes the center pivot type irrigation system 100 and a light assembly 305. EX1007, ¶[0023]. EX1003, ¶55.



FIG. 3

C. Agricultural management methods were well known in the art.

Computer systems have long been used to automate agricultural management. As early as the 1970s, "automatic irrigation systems have sensed the moisture level in the soil of the agricultural area and irrigated whenever necessary to maintain a predetermined moisture level in the soil." EX1011, 1:18-35. Indeed, the '543 Patent recognizes that at the time of the invention, the use of known "technologies and strategies for soil management and water resources, ... integration of the Internet of Things (IoT) into agriculture, and climate monitoring practices [were] *essential* for high crop performance and yield." EX1001, 1:48-56.¹ For example, while discussing prior art systems, the '543 Patent explained that "[t]he described irrigation pivot [of US2016/0198640 A1] can also comprise a control circuit configured to control the operation of light-emitting diodes, irrigation parameters, and pivot moving." EX1001, 2:30-32; EX1003, ¶\$56-57.

VI. U.S. PATENT NO. 12,089,543

The '543 Patent explains that the prior art "fails to reveal artificial light(s) supplementation combined with crop management factors. Instead, when artificial light(s) supplementation is used alone, as indicated in document US 2016/0198640 A1, this may not have the desired effect or may even impair plant development." EX1001, 2:33-48; EX1003, ¶58.

According to the '543 Patent, "the state of the art lacks technological improvements regarding integrated crop management strategies. Actions in crop

¹ All emphasis added unless otherwise noted.

fields are still evaluated independently and not integrally. The sustainable use of energy, fertilizers, water, and adequate artificial light(s) supplementation are essential for sustainable large-scale improved cropping activities. These large-scale cropping activities have a great responsibility in human impact on Earth's environments. Improving the sustainability of large-scale cropping activities is possible with the present invention." EX1001, 2:29-58; EX1003, ¶59.

In response to these alleged concerns, Patent Owner filed U.S. Patent No. 12,089,543, titled "System and method of agricultural management." The '543 Patent names Gustavo Alexandre Grossi as the sole inventor and is assigned to Fienile Agronegocios LTDA. It was originally filed as PCT/BR2022/050461 on November 24, 2022 and claims priority to BR 1020220072728, filed April 14, 2022. For the purposes of this proceeding only, Petitioner has assumed that the earliest effective filing date of the '543 Patent is April 14, 2022. EX1003, ¶60.

A. Person of Ordinary Skill in the Art

The '543 Patent relates generally to the field of agricultural management systems. A POSITA in the field of the '543 Patent on November 24, 2022 (the earliest priority date of the '543 Patent) would have held at least a Bachelor's degree in agricultural, biological or mechanical engineering, or a closely related field, and at least one year of work or research experience in the design or development of agricultural management systems and/or irrigation pivot systems. Additional

experience may compensate for less education, and additional education may compensate for less experience. EX1003, ¶¶61-63.

B. The '543 Patent's Prosecution History

The '543 Patent is a national stage application of International Patent Application No. PCT/BR2022/050461, filed under the Patent Cooperation Treaty (PCT). The national phase entry was submitted to the United States Patent and Trademark Office (USPTO) on January 26, 2024, accompanied by a preliminary amendment conforming the claims to those now issued. EX1002, p. 256; EX1003, ¶64.

The international application was examined by the USPTO in its capacity as the International Searching Authority (ISA), and both a positive International Search Report (ISR) and a Written Opinion (WO/ISA) were issued. EX1002, pp. 113, 240; EX1003, ¶65.

Concurrently with the U.S. national phase filing, the applicant submitted a request under the Patent Prosecution Highway (PPH), relying on the favorable opinion issued during the international phase. The PPH request was granted, and the application was advanced out of turn for examination. EX1002, p. 302; EX1003, **¶**66.

The '543 Patent was allowed in a first Office Action without any substantive rejections. No claim amendments were made during prosecution beyond those set

forth in the preliminary amendment submitted at national phase entry. The patent proceeded directly to issuance without any refusals or further substantive prosecution. EX1002, p. 351; EX1003, ¶67.

C. The '543 Patent's Claims

The '543 Patent has two independent claims (Claims 1 and 4) and five dependent claims. Independent Claim 4 recites an agricultural management method. Independent Claim 1 implements the method of Claim 4 using generic irrigation and lighting components. EX1003, ¶68. The alleged invention of the '543 Patent is described in additional detail, below.

1. Agricultural Management Method

Independent Claim 4 recites a method for determining and implementing an artificial light supplementation routine for cultivation of a crop in a field, while considering one or more undefined objectives for the development of the crop. The claimed method includes adjusting the balance of spectral bands emitted by a plurality of LEDs. EX1003, ¶¶69-70. Claim 4 is reproduced below in its entirety:

4. AGRICULTURAL MANAGEMENT METHOD (500),² for the cultivation of a crop (202 a) in an agricultural field (200), characterized by comprising the steps of:

² "Generally, the presence or absence of such reference characters does not affect the scope of a claim." Manual of Patent Examining Procedure, 608.01(m).

a) adjusting (501), in intervals of the electromagnetic spectrum, the balance between the spectral bands emitted by a plurality of light-emitting diodes of a plurality of artificial lighting sources (10 a, 10 b, 10 c, 10 d, 10 e); and

b) determining and implementing:

an irrigation routine (502) of a modular agricultural irrigation device (101); and/or

a routine of artificial light(s) supplementation (503) of the plurality of artificial lighting sources (10 a, 10 b, 10 c, 10 d, 10 e);

wherein stages a) and b) are determined considering at least one among:

a crop (202 a) species under cultivation;

a phenological stage of the crop (202 a) under cultivation; a season, a photoperiod, and current weather conditions under which the agricultural field (200) is subjected; and one or more objective(s) intended for the crop (202) development.

With respect to the "routine of artificial light(s) supplementation," the '543 Patent explains that the routine "occurs, preferably, between the phenological stages V3-V4 to R5-R6 of the crop 202 a under cultivation, and *the balance between the spectral bands is adjusted*." EX1001, 12:64-13:7. Thus, adjusting the balance between the spectral bands (the functional language in step "a") itself constitutes "implementing . . . a routine of artificial light(s) supplementation" (the second action of step "b"). EX1003, ¶71.

The '543 Patent also teaches that "an objective of the present invention is to provide an agricultural management system *combined with* artificial light(s) supplementation." EX1001, 2:62-3:2. "The routine of light(s) supplementation is usually independent of the irrigation routine." EX1001, 3:3-9. "In other words, according to the established routine, a processor can command the action of the drive device, water sprinkle device, and the light dimerizer or polarizer. A processor determines this routine, preferably using an artificial intelligence model." EX1001, 7:60-8:3; EX1003, ¶72.

Despite emphasizing in the specification that the invention comprises the combination of an agricultural management routine (such as an irrigation routine) and an artificial light(s) supplementation routine, the '543 Patent does not actually claim said combination. EX1003, ¶73. Rather, Claim 4 recites several *optional* limitations, which do not impact the scope of the claims. *Cochlear Bone Anchored Sols. AB v. Oticon Med. AB*, 958 F.3d 1348, 1359-60 (Fed. Cir. 2020) ("Claim 10 recites a 'directivity means comprising at least one directivity dependent microphone and/or signal processing means in the electronic circuitry.' The use of the disjunctive creates three alternative subsets of claim coverage—a directivity dependent microphone only; signal processing means only; and a directivity dependent

microphone together with signal processing means. The first alternative is independent of the others, and it has a discernible meaning and can be compared to prior art.").

Here, Claim 4 recites determining and implementing "an irrigation routine (502) of a modular agricultural irrigation device (101); **and/or** a routine of artificial light(s) supplementation (503) of the plurality of artificial lighting sources (10 a, 10 b, 10 c, 10 d, 10 e)." Because Claim 4 uses the disjunctive "and/or," invalidity can be shown through prior art that discloses (1) an irrigation routine of a modular agricultural irrigation device, (2) a routine of artificial light supplementation of a plurality of artificial lighting sources, or (3) both. *Cochlear Bone Anchored Solutions*, 958 F.3d at 1359-60. EX1003, ¶74.

Similarly, Claim 4 recites determining and implementing the claimed light supplementation routine based on (1) the specific crop species in question, (2) the phenological stage of the crop species, or (3) the season, photoperiod, and weather conditions of the field. But again, these factors are not actually required by the claim. EX1003, ¶75. Rather, Claim 4 merely states that the claimed artificial light supplementation routine must be developed or implemented while considering "one or more objective(s) intended for the crop (2) development." EX1001, Cls. 1, 4. The specification teaches that a POSITA would have understood "objective(s) intended for the crop in gof such plant specie[s]." EX1001,

4:41-47. Furthermore, "the objective(s) with crop 202 a development is to stimulate or inhibit the production of leaves, branches, roots, grains, fibers, fruits, and essences and, also, to stimulate or inhibit vegetative and reproductive growth and photosynthesis." EX1001, 12:59-63. EX1003, ¶76.

2. Agricultural Management System

Independent Claim 1 merely implements the method of Claim 4 using generic structural components. Specifically, Claim 1 requires that the agricultural irrigation device is (1) modular and (2) pivot-like, and contains (3) a plurality of LEDs, (4) a plurality of power sources, (5) a processor, and (6) either a dimerizer or a polarizer. EX1001, Cl. 1. Claim 1 further requires that the plurality of LEDs are located "at a predetermined distance above the aerial parts of the crop." The specification explains that "[t]he light-emitting diodes can be implemented in any new or preexisting irrigation pivot in an agricultural cropping area." EX1001, 3:3-9; EX1003, ¶77.

VII. THE PRIOR ART

A. U.S. Patent Pub. No. 2019/0098843 ("Rosen")

U.S. Patent Pub. No. 2019/0098843 ("Rosen") was published on April 4, 2019, and is prior art to the '543 Patent under 35 U.S.C. § 102(a)(1). EX1005. Rosen is titled "Intelligent horticulture light" and names Steven Rosen, Ronald Cozean, Eric Allen, David Edward Mordetzky, Megan Horvath, Anthony John Pyros, John

Elwood, Michael Chang, and Elie Attarian as inventors. EX1005, (54), (72). Rosen is assigned to Resilience Magnum IP, LLC. EX1005, (71). EX1003, ¶78.

Rosen discloses "A horticulture light [that] can . . . determine at least one action for the horticulture light bulb to perform based on a state of the at least one characteristic and at least one objective of the installation of the horticulture light bulb in the horticulture environment, and execute the at least one action." EX1005, Abstract. Rosen teaches that its horticulture lights can be employed in a "field," "outdoor environment," "or any other suitable horticulture environment." EX1005, [0024]; EX1003, ¶79. Rosen likewise teaches that its "horticulture light can employ sensors to monitor plants in the horticulture environment, and customize light output and/or control other systems . . . to enhance growth of the plants based on their plant characteristics . . . and/or environmental characteristics." EX1005, [0026]. Specifically, Rosen identifies watering and fertilizing as examples of systems which can be controlled by the disclosed horticulture light. *Id.*; EX1003, ¶80.

B. U.S. Patent Pub. No. 2021/0185945 ("Richardville")

U.S. Patent Pub. No. 2021/0185945 ("Richardville") was published on June 24, 2021, and is prior art to the '543 Patent under 35 U.S.C. § 102(a)(1). EX1007. Rosen is titled "Illuminated irrigation system" and names Matthew Richardville as the sole inventor. EX1007, (54), (72). EX1003, ¶81.
Richardville discloses "[a] light assembly mounted to a span of an irrigation system. The light assembly includes at least one bracket, at least one extension, and a light bar." EX1007, Abstract. Specifically, Richardville discloses a "center pivot type irrigation system" which includes "one or more spans," "one or more drive units," and "one or more pivot legs." EX1007, ¶¶[0014], [0019]; EX1003, ¶82.

VIII. GROUND 1: CLAIMS 1-7 OF THE '543 PATENT ARE INVALID AS INDEFINITE UNDER 35 U.S.C. §112.

"[A] patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014). The '543 Patent is replete with amorphous structural limitations, subjective catchall language, unclear references to artificial intelligence which lacks antecedent basis, and unintelligible process limitations, each of which render the Challenged Claims invalid as indefinite.

"The claims, when read in light of the specification and the prosecution history, must provide *objective boundaries* for those of skill in the art." *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1371 (Fed. Cir. 2014); *see also Nautilus*, 572 U.S. at 911 & n.8 (indicating that there is an indefiniteness problem if the claim language "might mean several different things and 'no informed and confident

choice is available among the contending definitions"); *Halliburton Energy Servs.*, *Inc. v. M-I LLC*, 514 F.3d 1244, 1251 (Fed. Cir. 2008) ("The fact that [the patent holder] can articulate a definition supported by the specification . . . does not end the inquiry. Even if a claim term's definition can be reduced to words, the claim is still indefinite if a person of ordinary skill in the art cannot translate the definition into meaningfully precise claim scope.").

"In the face of an allegation of indefiniteness, general principles of claim construction apply." *Enzo Biochem, Inc. v. Applera Corp.*, 599 F.3d 1325, 1332 (Fed. Cir. 2010) (internal citations omitted). "In that regard, claim construction involves consideration of primarily the intrinsic evidence, viz., the claim language, the specification, and the prosecution history." *Id*.

"Precedent guides that absent some effort at distinction, the independent and dependent claims rise or fall together." *Soverain Software LLC v. Newegg Inc.*, 728 F.3d 1332, 1335-36 (Fed. Cir. 2013) (cleaned up); *see also SIBIA Neurosciences, Inc. v. Cadus Pharm. Corp.*, 225 F.3d 1349, 1359 (Fed. Cir. 2000).

A. The '543 Patent does not inform a POSITA about the scope of certain structural elements with reasonable certainty.

1. Claims 1-3: a plurality of artificial lighting sources (10 a, 10 b, 10 c, 10 d, 10 e) arranged along the modular agricultural irrigation pivot-like device (101) at a predetermined distance above the aerial parts of the crop (202 a)

The '543 Patent claims LED lights arranged along an irrigation device at a "predetermined distance" above the "aerial parts of the crop." However, neither the claims nor the specification inform a POSITA of the scope of "predetermined distance," nor provide a POSITA with any guidance regarding which configurations of artificial lighting sources fall within—or are excluded from—the scope of the claims. EX1003, ¶83.

District courts have previously construed similar terms to encompass *any* predetermined distance. *Skyhook Wireless, Inc. v. Google, Inc.*, 159 F. Supp. 3d 144, 151 (D. Mass. 2015) ("In the independent claims, a person of ordinary skill would understand 'predetermined threshold' to mean any numerical cutoff."). EX1003, ¶84. However, such an approach does not render the Challenged Claims definite, because the claims lack a reference point for measuring the "predetermined distance." EX1003, ¶84. Instead, the specification's guidance regarding the "aerial parts of the crop" only introduces additional ambiguity. Specifically, the specification states:

The agricultural management system 100, combined with artificial light(s) supplementation, incorporates *a plurality of artificial lighting sources* 10 a, 10 b, 10 c, 10 d, 10 e arranged, for example, along the irrigation spans 102 a; 102 b of the agricultural irrigation modular device 101 and *may be located* at specific points and *at a predetermined distance above the aerial part (canopy, plant shoot) of the crops* 202 a[.]

EX1001, 7:25-36; EX1003, ¶84. A POSITA would have understood the claim's reference to the "aerial parts of the crop," read in light of the specification, to refer to the canopy or plant shoot, which collectively encompass any of the above-ground portions of the crop in question. EX1003, ¶85.

Because the '543 Patent does not identify a reference point for measuring the claimed "predetermined distance," a POSITA would have understood that the claim language "might mean several different things" and lacks an "informed and confident choice . . . among the contending definitions." *Nautilus*, 572 U.S. at 911 & n.8. For example, Claim 1 encompasses a plurality of artificial lighting sources arranged along the modular agricultural irrigation pivot-like device at *any* distance above the crop—so long as that location was "predetermined." EX1003, ¶86. However, any configurations of artificial lighting sources affixed to a pivot-like irrigation rig is necessarily affixed at a "predetermined" distance above the crops, at least insofar as the distance is necessarily "determined" when the lights are affixed.

EX1003, ¶87. As such, the clause "a predetermined distance above the aerial parts of the crop" is superfluous. EX1003, ¶87.

Because the claim recites a "predetermined distance" above an undefined point—*i.e.*, the aerial part of the plant—interpreting "predetermined distance" as "any distance" effectively (and improperly) renders the "aerial parts of the crop" limitation meaningless. *Wasica Fin. GmbH v. Cont'l Automotive Systems, Inc.*, 853 F.3d 1272, 1288 n.10 (Fed. Cir. 2017) ("It is highly disfavored to construe terms in a way that renders them void, meaningless, or superfluous."); *Bicon, Inc. v. Straumann Co.*, 441 F.3d 945, 950-51 (Fed. Cir. 2006) (rejecting a construction of a term that would render another limitation superfluous).

The "any distance" approach endorsed by the court in *Skyhook Wireless* cannot be correct, since it renders subsequent limitations meaningless. 159 F. Supp. 3d at 151. Because the specification provides no guidance regarding the proper scope of the "predetermined distance," nor how it is calculated with respect to the "aerial parts of the crop," Claims 1-3 of the '543 Patent are invalid as indefinite.

2. Claims 1-3: a processor in communication with a dimerizer and/or a polarizer of the plurality of artificial lighting sources

The specification does not define "dimerizer," nor does it have any meaning in the context of the Challenged Claims.³ EX1003, ¶88. Rather, it appears to be a term that was coined—but not explained—by Patent Owner. The specification does not provide any guidance, merely stating that "[a] light dimerizer or polarizer adjusts the luminous flux and the balance between the spectral bands emitted by a plurality of light-emitting diodes." EX1001, 8:25-48. But, the specification does not explain how a "dimerizer" is similar to or different from a polarizer, nor how (or if) the dimerizer "adjusts the luminous flux and the balance between the spectral bands emitted by a plurality of light-emitting diodes." Iridescent Networks, Inc. v. AT&T Mobility, LLC, 933 F.3d 1345, 1353 (Fed. Cir. 2019) ("because the disputed term is a coined term, meaning it has no ordinary and customary meaning, the question is whether the intrinsic evidence provides objective boundaries to the scope of the term"); Indacon, Inc. v. Facebook, Inc., 824 F.3d 1352, 1357 (Fed. Cir. 2016) (where "terms have no plain or established meaning to one of ordinary skill in the art . . .

³ The term "dimer" or "dimerize" appears to have meaning in other fields, most notably chemical fields, but does not have any relevance to the claimed subject matter. EX1003, ¶89.

they ordinarily cannot be construed broader than the disclosure in the specification"); *Irdeto Access, Inc. v. Echostar Satellite Corp.*, 383 F.3d 1295, 1300 (Fed. Cir. 2004); EX1003, ¶¶90-91.

Because the term "dimerizer" is a coined term with no associated disclosure in the specification, it "fail[s] to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus*, 572 U.S. 901. As such, Claim 1 of the '543 Patent is invalid as indefinite.

B. Claims 1-7 of the '543 Patent are indefinite due to use of subjective catchall limitations.

Claims 1 and 4 of the '543 Patent state that the claimed artificial light supplementation routine must be determined or implemented while considering "one or more objective(s) intended for the crop (2) development." EX1001, Cls. 1, 4. Claim 7, meanwhile, recites that the claimed soil management routine must be determined while considering "one or more objective(s) intended for the crop (202 a) development." EX1001, Cl. 7. The specification teaches that a POSITA would have understood "objective(s) intended for the crop' as the *main purpose* of the cropping of such plant specie[s]." EX1001, 4:41-47; EX1003, ¶¶92-93.

Claim terms which are "purely subjective and depend[] on the unpredictable vagaries of any one person's opinion [are] indefinite." *Intellectual Ventures I LLC v. T-Mobile USA, Inc.*, 902 F.3d 1372, 1381 (Fed. Cir. 2018) (cleaned up) (citing

Datamize, LLC v. Plumtree Software, Inc., 417 F.3d 1342, 1350-51 (Fed. Cir. 2005) ("A purely subjective construction . . . would not notify the public of the patentee's right to exclude since the meaning of the claim language would depend on the unpredictable vagaries of any one person's opinion. . . . While beauty is in the eye of the beholder, a claim term, to be definite, requires an objective anchor.")).

The Federal Circuit previously held the term "QoS requirements" was "entirely subjective and user-defined" where the specification analogized the disputed term to "a continuum, defined by what network performance characteristic *is most important to a particular user.*" *Intellectual Ventures I LLC v. T-Mobile USA, Inc.*, 902 F.3d 1372, 1381 (Fed. Cir. 2018). As in *Datamize* and *Intellectual Ventures I*, merely understanding that the "objective(s) intended for the crop (2) development" relates to the end-user experience fails to provide a POSITA with any way to determine whether the unidentified "objectives" have been considered while developing or implementing an artificial light supplementation routine. For this reason, the Challenged Claims are invalid as indefinite. EX1003, ¶94.

C. Claim 7's references to "the artificial intelligence model" lack antecedent basis and are therefore indefinite.

"A claim is indefinite when it contains words or phrases where the meaning is unclear, which may be the result of the lack of an antecedent basis." *In re Downing*, 754 F. App'x 988, 996 (Fed. Cir. 2018) (citing *In re Packard*, 751 F.3d 1307, 1310,

1314 (Fed. Cir. 2014)); EX1003, ¶95. Here, Claims 4, 6, and 7 are reproduced in part, below:

Claim 4	Claim 6	Claim 7
4. AGRICULTURAL	METHOD (500),	METHOD (500),
MANAGEMENT	according to claim 4, is	according to claim 6,
METHOD (500), for the	characterized by <u>further</u>	characterized in that
cultivation of a crop (202	<u>comprising a stage c)</u> of	stage c) of determining
a) in an agricultural field	determining a routine of	through the artificial
(200), characterized by	soil management in the	intelligence model
comprising the steps of:	agricultural field (200)	considers at least one of
a) adjusting	based on soil analyses	the following
b) determining and	from the agricultural field	
implementing	(200).	
wherein stages a) and		
b) are determined		
considering		

Of particular relevance, Claim 6 recites a "stage c" of "determining a routine of soil management" but does not reference the use of "artificial intelligence." Similarly, Claim 4 (which Claim 6 depends from) does not reference artificial intelligence. Nevertheless Claim 7 characterizes "stage c" as "determining *through the artificial intelligence model.*" Claim 7's reference to "*the* artificial intelligence model" creates ambiguity regarding which specific artificial intelligence model is referenced. Moreover, it is unclear whether the "determining" step of Claim 6 also requires use of "an artificial intelligence model." EX1003, ¶¶96-99.

Finally, the specification does not provide any guidance regarding any specific artificial intelligence models, nor does it inform a POSITA which model is appropriate to use for "determining a routine of soil management." As such, a POSITA would not have had reasonable certainty regarding which artificial intelligence model is implicated by Claim 7. EX1003, ¶¶100-101.

D. Claims 1-7 of the '543 Patent are indefinite due to their use of unintelligible process limitations.

In addition to including subjective, "catch-all" type limitations, Claims 1 and 4 of the '543 Patent also contain additional ambiguity which "fail[s] to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus*, 572 U.S. at 901.

Claim 1.B.iv and Claim 4.C both recite "stages a) and b) are determined. . ." EX1001, Cls. 1, 4. However, "stage a" does not include a "determining" step, but merely claims "adjusting" the artificial lights. The specification provides no additional guidance. As such, a POSITA would have had no way to know whether the factors recited in Claim 1.B.iv and Claim 4.C must also be considered while "adjusting" the artificial lights, nor would they have known what form said "considering" takes. EX1003, ¶¶102-105. For this reason, the Challenged Claims are indefinite. *Nautilus*, 572 U.S. at 901.⁴

IX. GROUND 2: CLAIMS 1-7 OF THE '543 PATENT ARE INVALID AS NOT ENABLED UNDER 35 U.S.C. § 112.

"The statutory basis for the enablement requirement is found in Section 112 of the patent statute, which provides in relevant part that a patent's specification must 'enable any person skilled in the art . . . to make and use' the patented invention. *Amgen Inc. v. Sanofi*, 987 F.3d 1080, 1084 (Fed. Cir. 2021) (citing 35 U.S.C. § 112(a)). "The purpose of the enablement requirement is to ensure that the public is told how to carry out the invention, *i.e.*, to make and use it." *Id.* The Federal Circuit has "held that such disclosure must be 'at least commensurate with the scope of the claims."" *Id.* (citing *Crown Operations Int'l v. Solutia Inc.*, 289 F.3d at 1367, 1378-79 (Fed. Cir. 2002); *Nat'l Recovery Techs., Inc. v. Magnetic Separation Sys.*, 166 F.3d 1190, 1196 (Fed. Cir. 1999)).

"To prove that a claim is invalid for lack of enablement, a challenger must show by clear and convincing evidence that a person of ordinary skill in the art would not be able to practice the claimed invention without 'undue experimentation."" *Alcon Research Ltd. v. Barr Labs., Inc.*, 745 F.3d 1180, 1188 (Fed. Cir. 2014) (citing

⁴ This argument applies with equal force to Claims 2 and 5. EX1003, ¶106.

In re Wands, 858 F.2d 731, 736-37 (Fed. Cir. 1988)). "Whether undue experimentation is needed is not a single, simple factual determination, but rather is a conclusion reached by weighing many factual considerations." *Id.* at 737. Those factors "(1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims." *Id.*

A POSITA would not have been able to practice several aspects of the claimed invention without undue experimentation. The '543 Patent broadly claims "determining and implementing" (1) irrigation routines, (2) artificial light supplementation routines, and (3) soil management routines, but does not provide any guidance as to how a POSITA would have done so. EX1001, Cls. 1, 4, 6; EX1003, ¶107-108. In effect, Patent Owner has claimed the very concept of undue experimentation—*i.e.*, the process of "determining" the irrigation routine. Dependent claims further add that said "determining" occurs "using an artificial intelligence model," but the '543 Patent does not explain how a POSITA would have used an artificial intelligence model to determine an irrigation routine. EX1001, Cls. 2, 5; EX1003, ¶109-110. "[T]he more a party claims, the broader the monopoly it demands, the more it must enable." *Amgen Inc. v. Sanofi*, 598 U.S. 594, 613, 143 S. Ct. 1243, 1256 (2023). "If a patent claims an entire class of processes, machines, manufactures, or compositions of matter, the patent's specification must enable a person skilled in the art to make and use the entire class. In other words, the specification must enable the full scope of the invention as defined by its claims. The more one claims, the more one must enable." *Amgen Inc. v. Sanofi*, 598 U.S. 594, 610, 143 S. Ct. 1243, 1254 (2023) (citing 35 U.S.C. §112(a)).

Thus, because the claimed irrigation, artificial light supplementation, and soil management routines would have been understood by a POSITA to broadly refer to *all* irrigation, supplementation, and soil management routines, the specification must likewise enable a POSITA to both determine, and implement *all* irrigation,

supplementation, and soil management routines.⁵ *Amgen*, 598 U.S. at 610. Given that the specification provides (1) no guidance regarding how a POSITA would "determine" an irrigation or soil management routine, and (2) only a single example of "determining" an artificial light supplementation routine, that burden is not met. EX1001, 8:25-48; EX1003, ¶111-112.

Finally, the *Wands* factors show that Claims 1-7 of the '543 Patent are not enabled. The '543 Patent recites extremely broad claims that purport to cover all mechanisms for determining and implementing irrigation, soil management, and

⁵ "[A] claim is not indefinite just because it is broad." *Niazi Licensing Corp. v. St. Jude Med. S.C., Inc.*, 30 F.4th 1339, 1347 (Fed. Cir. 2022); *see also Intellectual Ventures I, LLC v. Canon Inc.*, No. 13-473-SLR, 2015 U.S. Dist. LEXIS 38910, at *11 (D. Del. Mar. 27, 2015) (finding the term "image processing routines" not indefinite even though it "broadly refer[s] to an entire field of potential image processing techniques."). A narrower construction of at least the claimed irrigation and soil management routines is not supported by the specification, which fails to provide any guidance regarding the scope of those terms. EX1003, ¶113. If Patent Owner argues for a narrower construction, the claimed irrigation and soil management routines should be found indefinite or otherwise lacking written description support.

artificial light supplementation routines. Despite the breadth of the claims, the '543 Patent provides no examples of "determining" said routines. That is the very definition of undue experimentation. EX1003, ¶114.

Any factors not discussed herein are, at most, neutral.

A. Nature of Invention and Quantity of Experimentation (Factors 1, 4)

Factor 1 (the quantity of experimentation necessary) and factor 4 (the nature of the invention) weigh strongly against a finding of enablement. The challenged claims broadly cover all methods for "determining" irrigation, artificial light supplementation, and soil management routines (as well as all processors configured to "determine" irrigation, artificial light supplementation, and soil management routines). EX1003, ¶¶115-116. Given the dearth of guidance provided by the specification, a POSITA would face a near-impassible challenge of attempting to comprehend the near-limitless methods for "determining" an irrigation or soil management routine. EX1003, ¶117.

B. No Guidance or Examples Provided (Factors 2, 3)

The specification provides *absolutely no guidance* regarding how a POSITA would go about "determining" the claimed irrigation and soil management routines, and only a single example of "determining" an artificial light supplementation routine. EX1001, 8:25-48; EX1003, ¶118. As an example, the specification does not

provide irrigation times or quantifies, or soil management routines for particular plant varieties. Instead, a POSITA would have been left to blindly attempt various actions to see if they resulted in "determining" any of the claimed "routines." This lack of guidance or examples of irrigation, artificial light supplementation, and soil management routines causes factors 2 (the amount of direction or guidance presented) and 3 (the presence or absence of working examples) to weigh heavily in favor of a finding of undue experimentation. *Genentech, Inc. v. Novo Nordisk A/S*, 108 F.3d 1361, 1366 (Fed. Cir. 1997) ("Tossing out the mere germ of an idea does not constitute enabling disclosure. While every aspect of a generic claim certainly need not have been carried out by an inventor, or exemplified in the specification, reasonable detail must be provided in order to enable members of the public to understand and carry out the invention."); *see also* EX1003, ¶119.

C. The Breadth of the Claims (Factor 8)

Critically, claims are not enabled when "one of ordinary skill in the art could not practice their *full scope* without undue experimentation." *Wyeth & Cordis Corp. v. Abbott Labs.*, 720 F.3d 1380, 1384 (Fed. Cir. 2013). "Thus, a patentee chooses broad claim language at the peril of losing any claim that cannot be enabled across its full scope of coverage." *MagSil Corp. v. Hitachi Glob. Storage Techs., Inc.*, 687 F.3d 1377, 1381 (Fed. Cir. 2012). Here, the breadth of the claims—encompassing all methods to "determine" an irrigation, artificial light supplementation, or soil management routine—causes factor 8 to weigh against a finding of enablement. EX1003, ¶120.

D. Conclusion

In sum, the '543 Patent "provide[s] no more than a 'plan' or 'invitation' for those of skill in the art to experiment," and "do[es] not provide sufficient guidance or specificity as to how to execute that plan." *Enzo Biochem, Inc. v. Calgene, Inc.*, 188 F.3d 1362, 1374 (Fed. Cir. 1999). Because undue experimentation would be required to practice each of Claims 1-7, they are not enabled and therefore invalid. EX1003, ¶121.

X. GROUND 3: CLAIMS 1-7 OF THE '543 PATENT ARE INELIGIBLE UNDER 35 U.S.C. §101 BECAUSE THEY ARE DIRECTED TO INELIGIBLE SUBJECT MATTER.

Claims 1-7 the '543 Patent cover unpatentable abstract ideas, and are thus unpatentable under 35 U.S.C. § 101. EX1003, ¶122.

Alice sets forth a two-step test: one, whether the claims are directed to a patent-ineligible concept and two, if so, whether any "additional elements 'transform the nature of the claim' into a patent-eligible application." *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 573 U.S. 208, 216-18 (2014), quoting *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 77-79 (2012). "Put another way, there must be a further 'inventive concept' to take the claim into the realm of patent-eligibility." *In re BRCA1- & BRCA2-Based Hereditary Cancer Test Patent Litig. ("BRCA")*, 774

F.3d 755, 763 (Fed. Cir. 2014) (quoting *Alice*, 573 U.S. at 217-18). "This inventive concept must do more than simply recite 'well-understood, routine, conventional activity." *FairWarning IP, LLC v. Iatric Sys., Inc.*, 839 F.3d 1089, 1093 (Fed. Cir. 2016) (quoting *Mayo*, 566 U.S. at 79).

A. The Challenged Claims are directed to the abstract idea of providing plants with light, water, and soil to encourage growth.

Claim 4 of the '543 Patent recites nothing more than the abstract idea of providing plants with light, water, and soil to facilitate growth. The preamble to Claim 4 recites a method for cultivation of a crop in a field, which has been performed by mankind for thousands of years. EX1003, ¶¶123-124. The claimed method includes two steps: (a) adjusting a plurality of artificial lights,⁶ and (b) determining and implementing an irrigation or light supplementation routine. In short, Claim 4 of the '543 Patent claims (1) determining how to provide light or

⁶ Claim 4 further recites adjusting "the balance between the spectral bands emitted by a plurality of light-emitting diodes." Although the specification references the benefits of applying different colored light in different circumstances, the claims are not so limited. Adjusting "the balance between the spectral bands emitted by a plurality of light-emitting diodes" can also be accomplished by, for example, adjusting which of the plurality of light-emitting diodes are on. EX1003, ¶126.

water to a crop in order to facilitate or inhibit growth, (2) adjusting artificial lights, and (3) providing light or water to the crop. *See* Section VI.C, *supra*. This is nothing more than the abstract idea of providing plants with the optimal light and water to facilitate growth. EX1003, ¶125, 127.

Claims 6 and 7 similarly refer to determining how to provide appropriate soil to a crop in order to facilitate or inhibit growth. Again, this is nothing more than the abstract idea of providing plants with the optimal soil to facilitate growth. EX1003, ¶128.

B. The Challenged Claims lack an inventive concept.

"The 'inventive concept' may arise in one or more of the individual claim limitations or in the ordered combination of the limitations." *BASCOM Glob. Internet Servs. v. AT&T Mobility LLC*, 827 F.3d 1341, 1349 (Fed. Cir. 2016) (citing *Alice*, 134 S. Ct. at 2355). "An inventive concept that transforms the abstract idea into a patent-eligible invention must be significantly more than the abstract idea itself, and cannot simply be an instruction to implement or apply the abstract idea on a computer." *Id.* (citing *Alice*, 134 S. Ct. at 2358).

Claim 1 of the '543 Patent implements the method of Claim 4 on generic processing equipment. This is nothing more than an "instruction to implement or apply the abstract idea on a computer," which has consistently been held unpatentable. *BASCOM*, 827 F.3d at 1349; *see also* EX1003, ¶129. Similarly, Claims

1 and 3 recite generic irrigation components (e.g., an irrigation pivot with a plurality of LEDs, power sources, sprinklers, and a drive device. EX1003, ¶130. But again, references to generic structural components does not constitute an "inventive concept." *Intellectual Ventures I LLC v. Capital One Bank (USA)*, 792 F.3d 1363, 1366 (Fed. Cir. 2015) ("An abstract idea does not become nonabstract by limiting the invention to a particular field of use or technological environment.").

C. The '543 Patent's reference to "artificial intelligence" does not render it patent-eligible.

The Federal Circuit recently explained that "patents that do no more than claim the application of generic machine learning to new data environments, without disclosing improvements to the machine learning models to be applied, are patent ineligible under § 101." *Recentive Analytics, Inc. v. Fox Corp.*, 134 F.4th 1205, 1216 (Fed. Cir. 2025). Claims 2 and 5 of the '543 Patent claims nothing more than the application of "artificial intelligence" to determine irrigation routines, artificial light(s) supplementation routines, and (potentially) soil management routines. But, neither the claims nor the specification (1) disclose any improvements to either (1) the "artificial intelligence" or (2) the irrigation, artificial light(s) supplementation, or soil management routines. EX1003, ¶131-132. Instead, they improperly claim "determining" routines using generic "artificial intelligence." Simply put, these claims are "directed to the abstract idea of using a generic machine learning

technique in a particular environment, with no inventive concept." *Recentive Analytics*, 134 F.4th at 1208; EX1003, ¶¶133-134.

XI. GROUND 4: CLAIMS 1-7 OF THE '543 PATENT ARE OBVIOUS UNDER 35 U.S.C. § 103 OVER ROSEN

Claims 1-7 are obvious under 35 U.S.C. §103 over Rosen. Rosen (EX1005) was not considered during prosecution of the '543 patent and is more material than the prior art considered. EX1002; EX1003, ¶¶135-136.

A. Claim 1:

1. 1.Pre: AGRICULTURAL MANAGEMENT SYSTEM (100) is characterized by comprising:

To the extent that the preamble is determined to be limiting, Rosen discloses an agricultural management system. EX1003, ¶137. Specifically, Rosen discloses "a horticulture light that comprises instruments, and is able to communicate with other horticulture lights and other devices is presented that efficiently utilizes resources to enhance growth of plants." EX1005, ¶[0026]. Rosen's "horticulture light can understand its horticulture environment and device ecosystem using the instruments, and perform a self-configuration to optimize its functionality to enhance growth of plants in the horticulture environment and device ecosystem." EX1005, ¶[0026]; EX1003, ¶138.

The agricultural management system disclosed by Rosen is adapted for automation with a computer system. EX1005, ¶[0032] ("The subject disclosure is

directed to computer processing systems, computer-implemented methods, apparatus and/or computer program products that facilitate efficiently and automatically . . . employing horticulture lights 100, 200 that utilize resources . . . to enhance growth of plants."); EX1003, ¶139.

Figure 5 (reproduced below) depicts an exemplary block diagram of Rosen's agricultural management system:



Case No. PGR2025-00055 U.S. Patent No. 12,089,543 B2

EX1005, Fig. 5; EX1003, ¶140. Rosen teaches that "[d]evice 518 can be any electronic device that can electronically interact (e.g. unidirectional interaction or bidirectional interaction) with horticulture light 502, non-limiting examples of which can include a wearable electronic device or a non-wearable electronic device. It is to be appreciated that interaction can include in a non-limiting example, communication, control, physical interaction, or any other suitable interaction between devices." EX1005, ¶[0048]. "Non-wearable devices can include, for example, a system (e.g. temperature, humidity, watering, fertilizing, feeding, pollination, insect repellent, sound, air flow, air quality, windows, robots, or any other suitable systems associated with horticulture)." EX1005, ¶[0048]; EX1003, ¶141.

2. 1.A: a modular agricultural irrigation pivot-like device (101) positioned on an agricultural field (200) in the cultivation of a crop (202 a) species, the modular agricultural irrigation pivotlike device (101) comprising:

Rosen discloses or otherwise renders obvious a modular agricultural irrigation pivot-like device positioned on an agricultural field in the cultivation of a crop species. EX1003, ¶142.

Rosen discloses an agricultural device positioned on an agricultural field in the cultivation of a crop species. Specifically, Rosen discloses a "horticulture light [that] can understand its horticulture environment and device ecosystem . . . and perform a self-configuration to optimize its functionality to enhance growth of plants in the horticulture environment and device ecosystem." EX1005, ¶[0026]. Rosen provides examples of an applicable "horticulture environment," including a "grow room, greenhouse, *field*, indoor environment, *outdoor environment*, liquid environment, or any other suitable horticulture environment." EX1005, ¶¶[0024], [0059], [0062]; EX1003, ¶143.

Rosen also teaches that its "horticulture light can employ sensors to monitor plants in the horticulture environment, and customize light output and/or control other systems (e.g., temperature, humidity, *watering*, fertilizing, feeding, pollination, insect repellent, sound, air flow, air quality, windows, robots, or *any other suitable systems associated with horticulture*)." EX1005, ¶¶[0026], [0048]. A POSITA would have understood that a modular irrigation pivot was a known example of a "watering" system as well as another "suitable system[] associated with horticulture" for use in a horticulture environment such as a field. EX1003, ¶144.

For example, the "Background of the Invention" section of the '543 Patent identifies examples of known suitable systems associated with horticulture at the time of filing. EX1003, ¶145. Specifically, the '543 Patent explains that "Document US 2016/0198640 A1 [("Singh"); EX1006] reveals a *mobile irrigation pivot* equipped with sprinklers and a plurality of light-emitting diodes configured to emit different frequencies of polarized light in spectral bands from violet to far red

Case No. PGR2025-00055 U.S. Patent No. 12,089,543 B2

spectrum over plants of short, long, or neutral photoperiod response in an agricultural field." EX1001, 2:22-29. A POSITA would have understood that the mobile irrigation pivot disclosed in Singh would have been a "suitable system[] associated with horticulture" for use in a horticulture environment such as a field, as contemplated by Rosen. EX1003, ¶146; *see also* EX1005, ¶¶[0024], [0026].

The mobile irrigation pivot disclosed by Singh is depicted below:



EX1006, Fig. 1; EX1003, ¶147. The '543 Patent teaches that its agricultural management system "can be adapted to an irrigation new pivot or already existing in an agricultural field 200, such as a central irrigation pivot, whether towed or non-towable, or even a linear irrigation pivot." EX1001, 6:62-7:3; EX1003, ¶148.

A POSITA would have understood that a mobile irrigation pivot (such as, for example, the mobile irrigation pivot disclosed in Singh) would have been implemented as either a central irrigation pivot or a linear irrigation pivot, both of which are "pivot-like" devices. EX1003, ¶149. A POSITA would have further understood that mobile irrigation pivots such as the one disclosed in Singh are well-known in the art, and are conventionally implemented as modular devices. EX1003, ¶149; §V.A, *supra*.

Rosen also explicitly discloses that its system is modular. *See, e.g.*, EX1005, ¶¶[0034]-[0035] (explaining that Rosen's horticulture system "can include any suitable number of light emitting devices" and "can include other components" such as additional LEDs, reflectors, shades, positioning motors, "or any other suitable components needed according to functionality described herein"), ¶¶[0039]-[0040] ("horticulture light 100, 200 can have a modular configuration that allows for one or more power sources [and instruments] to be added or removed by a manufacturer or operator"), Figs. 1-2, 8-10; EX1003, ¶150..

a. 1.A.i: a plurality of artificial lighting sources (10 a, 10 b, 10 c, 10 d, 10 e) arranged along the modular agricultural irrigation pivot-like device (101) at a predetermined distance above the aerial parts of the crop (202 a), comprising a plurality of light-emitting diodes; and

Rosen discloses a plurality of artificial lighting sources arranged along the modular agricultural irrigation pivot-like device at a predetermined distance above the aerial parts of the crop, comprising a plurality of light-emitting diodes. EX1003, ¶151.

Rosen discloses a plurality of artificial lighting sources comprising a plurality of light emitting diodes. EX1003, ¶152. Rosen explicitly teaches that "[t]he subject disclosure relates generally to horticulture lights for growing plants" and "[a]ccording to an embodiment, a horticulture light bulb is provided." EX1005, ¶¶[0002], [0004]; EX1003, ¶152. Specifically, Rosen explains that:

Horticulture light 100 comprises a horticulture light bulb 102 which can be installed as a retrofit into a socket 116 of conventional light fixture 114. Horticulture light bulb 102 comprises *one or more light emitting devices* 104 a, 104 b, 104 c, 104 d, and 104 e (e.g. *light emitting diode (LED)*, organic light emitting diode (OLED), filament, quantum dot, incandescent, high-intensity discharge (HID), neon, fluorescent, compact fluorescent (CFL), electroluminescent (EL), laser, or any other suitable light emitting device) a housing 106, a base 108, a lens 110, and one or more instruments 112. *It is to be appreciated that while five light emitting devices 104 a, 104 b, 104 c, 104 d, and 104 e are depicted* for illustrative purposes only, horticulture light bulb 102 can include any suitable number of light emitting devices.

EX1005, ¶¶[0034]-[0035], Fig. 1; EX1003, ¶153; see also EX1005, ¶¶[0036]-[0038].

As discussed with respect to Ground 1, supra, a POSITA would have understood that the term "predetermined distance" refers to any distance. Skyhook Wireless, Inc. v. Google, Inc., 159 F. Supp. 3d 144, 151 (D. Mass. 2015) ("In the independent claims, a person of ordinary skill would understand 'predetermined threshold' to mean any numerical cutoff."); §VIII.A.1, supra; EX1003, ¶154. Moreover, a POSITA would have understood the claim's reference to the "aerial parts of the crop," read in light of the specification, to refer to the canopy or plant shoots, which collectively encompass any of the above-ground portions of the crop in question. §VIII.A.1, *supra*; EX1001, 7:25-36; EX1003, ¶154. As such, a POSITA would have found the limitation "predetermined distance above the aerial parts of the crops" indefinite for "fail[ing] to inform, with reasonable certainty, those skilled in the art about the scope of the invention." Nautilus, Inc. v. Biosig Instruments, Inc., 572 U.S. 898, 901 (2014); see also §VIII.A.1, supra; EX1003, ¶154.

If the Board determines this limitation is not indefinite, a POSITA would have understood it to encompass any predetermined arrangement of artificial lighting sources along the modular agricultural irrigation pivot-like device, so long as the artificial lighting sources are located "above" the aerial parts of the crop. EX1003, ¶155. With this understanding, Rosen discloses that the plurality of artificial lighting sources are arranged along the modular agricultural irrigation pivot-like device (101) at a predetermined distance above the aerial parts of the crop. EX1003, ¶155.

Rosen teaches that "[a] horticulture light can learn about its context and customize its configuration and/or operation in accordance with the context (e.g. using artificial intelligence). This can eliminate or minimize the need for an operator (e.g. user, administrator, or any other suitable entity) to perform manual configuration. Furthermore, a set of horticulture lights can automatically perform coordinated self-configuration and operation." EX1005, ¶[0031]. Rosen also teaches "that a user interface (not shown) can be provided that allows an operator to manually adjust the configuration generated by the horticulture light 100, 200." EX1005, ¶[0032]. A POSITA would have understood that manual configuration of the horticulture lights constitutes "predetermining" the placement of the artificial lighting sources. EX1003, ¶156-157. Consistent with this disclosure, Rosen depicts numerous examples of artificial lighting sources arranged above the aerial parts of plants. See, e.g., Figs. 8-12E; EX1003, ¶158.

b. 1.A.ii: a plurality of energy sources that feed the plurality of artificial lighting sources (10 a, 10 b, 10 c, 10 d, 10 e),

Rosen discloses a plurality of energy sources that feed the plurality of artificial lighting sources. EX1003, ¶159.

According to Rosen, "[a] horticulture light 100, 200 can include a power source." EX1005, ¶[0039]. Rosen teaches that "a horticulture light 100, 200 can have a constantly available power source, such as that provided by an electrical power grid" or "a temporary power source, such as a battery (e.g. disposable battery or rechargeable battery)." EX1005, ¶[0039]; *see also* EX1003, ¶160. Rosen's "horticulture light 100, 200 can have a plurality of different power sources, with one or more power sources acting as a backup for another power source." EX1005, ¶[0039]; *see also* EX1003, ¶161. A POSITA would have understood that the disclosed "plurality of different power sources" feed the plurality of artificial lighting sources. §XI.A.2.a; EX1003, ¶162.

3. 1.B: the agricultural management system (100) further comprising:

Rosen discloses an agricultural management system. See 1.Pre, supra.

a. 1.B.i: a processor in communication with a dimerizer and/or a polarizer of the plurality of artificial lighting sources (10 a, 10 b, 10 c, 10 d, 10 e) and with the plurality of energy sources, wherein the processor is configured to:

Rosen discloses a processor in communication with a dimerizer and/or a polarizer of the plurality of artificial lighting sources and with the plurality of energy sources. EX1003, ¶164.

Rosen teaches that its "horticulture light bulb comprises one or more instruments, a memory that stores computer executable components, and a processor that executes the computer executable components stored in the memory." EX1005, ¶[0004]; *see also* EX1005, ¶¶[0005]-[0006]. A POSITA would have understood that Rosen's processor would have been in electrical communication with the disclosed plurality of energy sources, in order to provide power to the processor. §XI.A.2.b; EX1003, ¶165.

Rosen's processor includes "an operation component that: determines at least one action for the horticulture light bulb to perform based on a state of the at least one characteristic and at least one objective of the installation of the horticulture light bulb in the horticulture environment, and executes the at least one action." EX1005, ¶[0004]; EX1003, ¶166.

Specifically Rosen discloses that its "computer processing systems" (including its processor), "facilitate efficiently and automatically (e.g., with little or

no direct involvement from an operator) employing horticulture lights 100, 200 that utilize resources (e.g. light output characteristics . . . or any other suitable resource employed in horticulture) to enhance growth of plants." EX1005, ¶[0032]. Similarly, Rosen's horticulture lights are "associated with at least one processor 506 that executes the computer executable components stored in the memory 514. Horticulture light 502 can further include a system bus 512 that can couple the various components including, but not limited to, horticulture management component 504, instruments 510, memory 514, processor 506, and/or other components." EX1005, ¶[0047]. "Device 518 can be any electronic device that can electronically interact (e.g. unidirectional interaction or bidirectional interaction) with horticulture light 502, non-limiting examples of which can include . . . for example, a [watering] system." EX1005, ¶[0048] ("interaction can include in a nonlimiting example, communication, control, physical interaction, or any other suitable interaction between devices"); EX1003, ¶167.

A POSITA would have understood that Rosen's processor is in communication with systems for altering "light output characteristics . . . to enhance the growth of plants." EX1003, ¶168; *see also* EX1005, ¶[0027] ("the horticulture light can adjust light output (e.g. spectrum, wavelength, frequency, intensity, pattern, direction, etc.) to optimize plant growth"); EX1005, ¶[0080] ("customization of light output from horticulture light 502 can relate to lighting output patterns, hues, light

output movements, intensities, spectrum, saturation, light direction, reflection, refraction, dispersion, *polarization*, on or off interval durations of light output, or any other suitable lighting attribute from one or more horticulture lights 502"). A POSITA would have additionally understood that customization of the "polarization" of light output from horticulture light 502 is accomplished through use of a polarizer. EX1003, ¶169.

b. 1.B.ii: a) adjust (501), in the intervals of the electromagnetic spectrum, the balance between the spectral bands emitted by the plurality of light-emitting diodes; and

Rosen discloses a processor configured to adjust, in the intervals of the electromagnetic spectrum, the balance between the spectral bands emitted by the plurality of light-emitting diodes. EX1003, ¶170. A POSITA would have understood that Rosen's horticulture lights are controlled by the disclosed processor. §XI.A.3.a; EX1003, ¶171.

Specifically, Rosen's horticulture lights (including Rosen's processor), are configured to:

[E]mploy pattern recognition to determine characteristics, such as a type of plant, stage of growth, development of the plant over time, ... lighting conditions, plant watering conditions, soil condition, ... or any other suitable condition associated with the plant(s) growing in the horticulture room. Based on the characteristics, *the horticulture light can adjust light output (e.g. spectrum*, wavelength, frequency, intensity,

pattern, direction, etc.) to optimize plant growth and cost (e.g. costbenefit analysis). A set of horticulture lights can operate in a coordinated manner to optimize plant growth and cost for one or more plants.

EX1005, ¶[0027]; EX1003, ¶172. A POSITA would have understood that the referenced "horticulture room" likewise includes any appropriate horticulture environment, such as a field. EX1005, ¶[0024]; §XI.A.2; EX1003, ¶173.

Moreover, "[c]ustomization of light output . . . can relate to lighting output patterns, hues, light output movements, intensities, spectrum, saturation, light direction, reflection, refraction, dispersion, polarization, on or off interval durations of light output, or any other suitable lighting attribute from one or more horticulture lights 502." *Id.*, ¶[0080]; EX1003, ¶174.

Rosen also teaches that "although the term 'horticulture light' is used herein, in various embodiments, the examples provided can include *one or more horticulture lights operating independently or in a distributed fashion*." EX1005, ¶[0031]; *see also id.*, ¶[0082] ("Operation component 704 of horticulture light 802 a can customize light output according to the monitored characteristics and one or more objectives. Likewise, horticulture lights 802 b, 802 c, 802 d, 802 e, 802 f, 802 g, 802 h, 802 l can have their respective defined areas that they monitor and customize light output. It is to be appreciated that 802 a, 802 b, 802 c, 802 d, 802 e, 802 f, 802 g, 802 h, 802 i, 802 j, 802 k, and 802 l can coordinate their

customized light outputs. For example, since light output from a horticulture light may enter a defined area of another horticulture light, the horticulture lights can coordinate one or more parameters of their respective light outputs."). A POSITA would have understood that independently adjusting the spectrum of a plurality of horticulture lights constitutes adjusting "the balance between the spectral bands emitted by the plurality of light-emitting diodes." EX1003, ¶¶175-176.

As a specific example, Rosen teaches that "operation component 704 can customize light output of horticulture light 1202 in a red light spectrum to stimulate flowering and/or fruit production." EX1005, ¶[0090]. A POSITA would have likewise understood customizing the "red light spectrum" to encompass "adjust[ing], in the intervals of the electromagnetic spectrum, the balance between the spectral bands emitted by the plurality of light-emitting diodes." EX1003, ¶177; *see also* ¶¶[0032]-[0033], [0047], [0050]-[0058], [0070], [0072]-[0080], [0087]-[0092].

c. 1.B.iii: b) determine and implement: an irrigation routine (502); and/or an artificial light(s) supplementation routine (503);

Rosen discloses a processor configured to determine and implement: an irrigation routine; and/or an artificial light(s) supplementation routine. EX1003, ¶178. Rosen teaches both irrigation routines and artificial light supplementation routines. Specifically, Rosen teaches that its horticulture light "determines at least

one action for the horticulture light bulb to perform." EX1005, ¶[0004]. Simply put, Rosen teaches that:

Horticulture light 502 can include horticulture management component 504 that can enable horticulture light 502 to understand the environment in which the horticulture light 502 is installed, *determine an objective of the installation*, perform a self-configuration according to the determined objective, and *operate to achieve the determined objective* related to efficiently enhancing plant growth.

EX1005, ¶[0046]; EX1003, ¶179.

Rosen provides additional detail regarding the claimed "determining" and "implementing" steps:

The horticulture light can understand its horticulture environment and device ecosystem using the instruments, and perform a self-configuration to optimize its functionality to enhance growth of plants in the horticulture environment and device ecosystem. For example, the horticulture light can employ sensors to monitor plants in the horticulture environment, and customize light output and/or control other systems (e.g. . . . watering . . .) to enhance growth of the plants based on their plant characteristics . . . and/or environmental characteristics. . . .

EX1005, ¶[0026]; *see also id.,* ¶¶[0027]-[0028] ("the horticulture light can learn over time lighting, watering, soil, air, plant spacing, and other conditions that enhance plant growth for respective plant types and adjust operations accordingly.
The horticulture light can adjust its lights, employ tools, or instruct other devices/systems on operations to enhance plant growth. . . . For example, the horticulture light can instruct a water system to increase water flow to one or more plants"); EX1003, ¶180. As such, a POSITA would have understood that Rosen discloses both (1) determining, and (2) implementing both irrigation and artificial light supplementation routines.⁷ EX1003, ¶181; *see also* ¶¶[0005]-[0006], [0029]-[0033], [0042]-[0044], [0047], [0050]-[0058], [0061], [0063], [0065]-[0066], [0070], [0072]-[0080], [0087]-[0092].

⁷ As explained with respect to Ground 2, *supra*, the '543 Patent does not enable certain limitations of the Challenged Claims related to "determining" various routines. §IX, *supra*. To the extent that the Board determines that the "determining" limitations are enabled and definite, Rosen discloses determining routines in at least as much detail as the '543 Patent.

d. 1.B.iv: wherein stages a) and b) are determined by the processor considering at least one among: a crop (202 a) species under cultivation; a phenological stage of the crop (202 a) under cultivation; a photoperiod, a season and current weather conditions under which the agricultural field (200) is subjected; and one or more objective(s) intended for the crop (202 a) development.

Rosen discloses wherein stages a) and b) are determined by the processor considering at least one among: a crop species under cultivation; a phenological stage of the crop under cultivation; a photoperiod, a season and current weather conditions under which the agricultural field is subjected; and one or more objective(s) intended for the crop development. EX1003, ¶182.

Although only one category is required to render the challenged claims obvious—in light of the fact that the claim language refers to "at least one among"—

Rosen discloses "stages a) and b) are determined by the processor considering"⁸ each of (1) a crop species under cultivation; (2) a phenological stage of the crop under cultivation; (3) a photoperiod, a season and current weather conditions under which the agricultural field is subjected; and (4) one or more objective(s) intended for the crop development. EX1003, ¶183.

<u>A crop species under cultivation.</u> Rosen discloses that its "horticulture light can employ sensors to monitor plants in the horticulture environment, and customize light output and/or control other systems . . . to enhance growth of the plants based on their plant characteristics (e.g. *type of plant*, stage of growth . . . or any other suitable characteristics associated with the plants)." EX1005, ¶¶[0026]-[0028]; *see also id.*, ¶¶[0061]-[0069]. A person of ordinary skill in the art would have understood "type of plant" to be synonymous with "crop species." EX1003, ¶184.

⁸ As explained in Section VIII.D, *supra*, Claim limitation 1.B.iv indefinite at least because it alleges that "stages a) and b) are *determined* by the processor." However, stage a) does not recite a step of "determining." To the extent that the Board determines the Challenged Claims are not indefinite, a POSITA would have understood that stages a) and b) are implemented by Rosen's processor—including the "determining" step of stage b)—while considering each of the factors recited in limitation 1.B.iv for the reasons recited herein. EX1003, ¶183 n.4.

Case No. PGR2025-00055 U.S. Patent No. 12,089,543 B2

<u>A phenological stage of the crop under cultivation.</u> Rosen discloses that its "horticulture light can employ sensors to monitor plants in the horticulture environment, and customize light output and/or control other systems . . . to enhance growth of the plants based on their plant characteristics (e.g. type of plant, *stage of growth*. . . or any other suitable characteristics associated with the plants)." EX1005, ¶¶[0026]-[0028]; *see also id.*, ¶¶[0061]-[0069]. A person of ordinary skill in the art would have understood "stage of growth" to be synonymous with "phenological stage." EX1003, ¶185.

A photoperiod, a season and current weather conditions under which the agricultural field is subjected. Rosen discloses its "computer executable components can comprise: a monitoring component that employs at least one instrument of the one or more instruments to monitor at least one characteristic of a defined region in which at least one plant is planted in a horticulture environment in which horticulture light bulb is installed; and an operation component that: determines at least one action for the horticulture light bulb to perform based on a state of the at least one characteristic." EX1005, ¶[[0004]-[0006]; *see also id.*, ¶[[0026]-[0028] ("horticulture light can employ sensors to monitor plants in the horticulture environment, and customize light output and/or control other systems ... to enhance growth of the plants based on ... environmental characteristics (e.g. temperature, humidity, ambient lighting, air quality, water

quality, soil quality, soil moisture, pests, location, location relative to other plants, ambient sounds, or any other suitable characteristic associated with a horticulture environment)"); ¶¶[0061]-[0069]; EX1003, ¶186.

A person of ordinary skill in the art would have understood the "environmental characteristics" disclosed by Rosen to include "photoperiod", "season" and "current weather conditions" for the field. Specifically, a person of ordinary skill in the art would have understood that ambient lighting refers to the total light available in the plant's environment, from both natural and artificial sources, and therefore encompasses a "photoperiod." EX1003, ¶187.

<u>One or more objective(s) intended for the crop development.</u>⁹ Rosen discloses that its "computer executable components can comprise . . . and an

⁹ As explained in Section VIII.B, *supra*, Claim limitation 1.B.iv is subject to indefiniteness challenges. Specifically, this limitation is indefinite because it is "purely subjective and depend[] on the unpredictable vagaries of any one person's opinion [are] indefinite." *Intellectual Ventures I LLC v. T-Mobile USA, Inc.*, 902 F.3d 1372, 1381 (Fed. Cir. 2018). To the extent that the Board determines this element is not indefinite, a POSITA would have understood that stages a) and b) are implemented by Rosen's processor while considering "at least one objective of the

operation component that: determines at least one action for the horticulture light bulb to perform based on . . . at least one objective of the installation of the horticulture light bulb in the horticulture environment." EX1005, ¶¶[0004]-[0006]; *see also id.*, ¶[0025] ("efficiency can be based on an objective . . . of the horticulture environment defined by a user and/or the system"); ¶[0031] ("All examples below can involve coordination amongst a set of horticulture lights to achieve a horticulture objective, whether explicitly stated or not."); ¶¶[0043]-[0044], [0061]-[0069]; Fig. 5; EX1003, ¶188.

B. Claim 2: SYSTEM (100), according to claim 1, characterized in that stages a) and b) determined by the processor using an artificial intelligence model.

Rosen discloses the system, according to claim 1, characterized in that stages a) and b) [are] determined by the processor using an artificial intelligence model.

installation of the horticulture light" as explained herein. EX1005, ¶¶[0004]-[0006]; see also EX1003, ¶188 n.5.

EX1003, ¶189.¹⁰ Rosen discloses the system, according to Claim 1. See Claim 1, supra.

Specifically, Rosen teaches that "[t]he horticulture light has artificial intelligence capabilities and can employ sensors to monitor environmental condition in a horticulture environment and growth conditions of plants in the horticulture room, and optimize its function to manage costs of operation of the horticulture room and maximize plant growth." EX1005, ¶[0027]; *see also id.*, ¶¶[0029]-[0032] ("A horticulture light can learn about its context and customize its configuration and/or operation in accordance with the context (e.g. using artificial intelligence)."); ¶[0077] ("operation component 704 can employ artificial intelligence to monitor the horticulture environment for conditions of the characteristics according to the determined one or more objectives using instruments 510, determine one or more suitable actions for horticulture light 502 to perform to achieve the determined one

¹⁰ As explained in Section VIII.D, *supra*, Claim 2 is indefinite at least because it alleges that "stages a) and b) [are] *determined* by the processor." However, stage a) does not recite a step of "determining." To the extent that the Board determines the Challenged Claims are not indefinite, a POSITA would have understood that stages a) and b) are implemented by Rosen's processor—including the "determining" step of stage b)— using an artificial intelligence model. EX1003, ¶189 n.6.

or more objectives based on the conditions of the characteristics and the determined capabilities, and execute the one or more suitable actions"); ¶¶[0093]-[0094], [0100]-[0102]; EX1003, ¶191.

A person of ordinary skill in the art would have understood the "artificial intelligence capabilities" disclosed by Rosen to describe at least the ability of the processor to utilize an "artificial intelligence model." EX1003, ¶192.

C. Claim 3:

1. **3.Pre: SYSTEM (100), according to claim 1, characterized in that the modular agricultural irrigation pivot-like device (101) comprises:**

Rosen discloses the system according to claim 1. See Claim 1, supra.

2. 3.A: a drive device for the displacement of the modular agricultural irrigation device (101) over the agricultural field (200); and

Rosen discloses a drive device for the displacement of the modular agricultural irrigation device over the agricultural field. EX1003, ¶194.

Specifically, Rosen discloses that "[d]evice 518 can be any electronic device that can electronically interact (e.g. unidirectional interaction or bidirectional interaction) with horticulture light 502, non-limiting examples of which can include ... for example, a system (e.g. temperature, humidity, *watering*, fertilizing, feeding, pollination, insect repellent, sound, air flow, air quality, windows, *robots*, or any other suitable systems associated with horticulture)." EX1005, ¶[0048] ("interaction can include in a non-limiting example, communication, control, physical interaction, or any other suitable interaction between devices"). EX1003, ¶195.

Rosen discloses or otherwise renders obvious a modular agricultural irrigation device positioned on an agricultural field. *See* Claim 1.A, *supra*. A POSITA would have understood that "watering" systems refer to irrigation systems such as irrigation pivot systems, and the implementation of and "robots, or any other suitable systems associated with horticulture" constitute "a drive device for the displacement of the modular agricultural irrigation device over the agricultural field." EX1003, ¶¶196-197. Moreover, a POSITA would have understood that irrigation pivots are typically mobile and require a drive device to efficiently provide irrigation to an entire field, and a POSITA would have understood that the system of Rosen could be combined with an irrigation pivot.

As further evidence, Singh (which is discussed in the "Background of the Invention" section of the '543 Patent) discloses that "the irrigation rig 100 may comprise a plurality of wheels 112 a . . . 112 b (collectively wheels 112) so that the irrigation system can be a mobile system. Further, the irrigation rig 100 may comprise, or may be communicatively coupled, to a control circuit configured to control an operation of the light sources 103, the sprinklers 106, and/or an operation of the wheels 112." EX1006, ¶[0033]; EX1003, ¶198.

Case No. PGR2025-00055 U.S. Patent No. 12,089,543 B2

3. **3.B:** sprinkler devices comprising a plurality of sprinklers,

Rosen discloses sprinkler devices comprising a plurality of sprinklers. EX1003, ¶199. Specifically, Rosen teaches that "Device 518 can be any electronic device that can electronically interact (e.g. unidirectional interaction or bidirectional interaction) with horticulture light 502, non-limiting examples of which can include ... for example, a [watering] system." EX1005, ¶[0048] ("interaction can include in a non-limiting example, communication, control, physical interaction, or any other suitable interaction between devices"). A POSITA would have understood that a watering system would comprise sprinkler devices comprising a plurality of sprinklers. EX1003, ¶200; see also EX1005, ¶¶[0063]-[0066], Figs. 9-10. For example, Singh (which is discussed in the "Background of the Invention" section of the '543 Patent) discloses "an irrigation rig 100, which can be part of a water irrigation system for a field" and "includes . . . a plurality of sprinklers." EX1006, ¶[0033]. Indeed, Rosen explicitly discloses a plurality of "combination feeder/water spray heads," which a POSITA would have understood to comprise "sprinkler devices comprising a plurality of sprinklers." EX1005, ¶¶[0065]-[0066]; EX1003, ¶201.

4. **3.C:** wherein the processor is in communication with the drive device and with the sprinkler device for the execution of stage b).

Rosen discloses wherein the processor is in communication with the drive device and with the sprinkler device for the execution of stage b). EX1003, ¶202.

Rosen teaches that its "horticulture light bulb comprises one or more instruments, a memory that stores computer executable components, and a processor that executes the computer executable components stored in the memory." EX1005, ¶[0004]; *see also* EX1005, ¶¶[0005]-[0006]. Additionally, Rosen's "horticulture light that comprises instruments, and is able to communicate with other horticulture lights and other devices." EX1005, ¶[0026]. Specifically, "[a] horticulture light 100, 200 can communicate via any suitable form of wireless or wired communication using a communication device. Non-limiting examples of wireless communication, electromagnetic induction communication, or any other suitable wireless communication." EX1005, ¶[0040]; EX1003, ¶203.

A POSITA would have understood that the claimed "drive device" and "sprinkler device" are "other devices" which are in communication with Rosen's horticulture light. EX1003, ¶204; §§XI.C.2-3. The drive device and sprinkler device "can electronically interact... with horticulture light 502.... It is to be appreciated that interaction can include, in a non-limiting example, communication." EX1005, ¶[0048]; EX1003, ¶205.

Given that Rosen's horticulture light bulb (1) contains a processor (Claim 1.B.i, *supra*), (2) is responsible for the execution of stage b) (Claim 1.B.iii, *supra*), and (3) is in communication with both the drive device and the sprinkler device (Claims 3.A, 3.B, *supra*), a POSITA would have understood that Rosen's processor is in communication with the drive device and with the sprinkler device for the execution of stage b). A POSITA would have understood that adjusting the location of the irrigation device and/or activating (or deactivating) the sprinklers is a part of implementing the irrigation or light supplementation routines described with respect to limitation 1.B.iii, *supra*. In light of the foregoing disclosures of Rosen, a POSITA would have understood that Rosen's horticulture light bulb (and the processor associated with the horticulture bulb) are in communication with drive device and sprinkler device disclosed therein. EX1003, ¶¶206-207; see also EX1005, ¶¶[0072]-[0080].

D. Claim 4:

1. 4.Pre: AGRICULTURAL MANAGEMENT METHOD (500), for the cultivation of a crop (202 a) in an agricultural field (200), characterized by comprising the steps of:

To the extent that the preamble is determined to be limiting, Rosen discloses an agricultural management method, for the cultivation of a crop in an agricultural field. EX1003, ¶208; *see also* Claim 1.Pre, 1.A, *supra*.

Specifically, a POSITA would have understood that operation of the system described in Claim 1 constitutes practicing an agricultural management method. For example, Rosen explicitly teaches that "[t]he subject disclosure is directed to computer processing systems, *computer-implemented methods*, apparatus and/or computer program products that facilitate efficiently and automatically (e.g., with little or no direct involvement from an operator) employing horticulture lights 100, 200 that utilize resources (e.g. light output characteristics, sunlight, energy, water, fertilizer, feed, insecticide, pest repellant, chemicals, devices, bees, or any other suitable resource employed in horticulture) to enhance growth of plants." EX1005, ¶[0032]; EX1003, ¶209.

2. 4.A: a) adjusting (501), in intervals of the electromagnetic spectrum, the balance between the spectral bands emitted by a plurality of light-emitting diodes of a plurality of artificial lighting sources (10 a, 10 b, 10 c, 10 d, 10 e); and

Rosen discloses adjusting, in intervals of the electromagnetic spectrum, the balance between the spectral bands emitted by a plurality of light-emitting diodes of

a plurality of artificial lighting sources. EX1003, ¶210; see also Claim 4.Pre, 1.A.i,

1.B.ii, supra.

3. 4.B: b) determining and implementing: an irrigation routine (502) of a modular agricultural irrigation device (101); and/or a routine of artificial light(s) supplementation (503) of the plurality of artificial lighting sources (10 a, 10 b, 10 c, 10 d, 10 e);

Rosen discloses determining and implementing: an irrigation routine of a modular agricultural irrigation device; and/or a routine of artificial light(s) supplementation of the plurality of artificial lighting sources. EX1003, ¶211; *see also* Claim 4.Pre, 1.A, 1.B.iii, *supra*.

4. 4.C: wherein stages a) and b) are determined considering at least one among: a crop (202 a) species under cultivation; a phenological stage of the crop (202 a) under cultivation; a season, a photoperiod, and current weather conditions under which the agricultural field (200) is subjected; and one or more objective(s) intended for the crop (202) development.

Rosen discloses wherein stages a) and b) are determined considering at least one among: a crop species under cultivation; a phenological stage of the crop under cultivation; a season, a photoperiod, and current weather conditions under which the agricultural field is subjected; and one or more objective(s) intended for the crop development. EX1003, ¶212; *see also* Claim 4.Pre, 1.B.iv, *supra*.

E. Claim 5: METHOD (500), according to claim 4, characterized in that stages a) and b) are determined by the processor using an artificial intelligence model.

Rosen discloses the method according to claim 4. See Claim 4, supra.

Case No. PGR2025-00055 U.S. Patent No. 12,089,543 B2

Rosen discloses the method, according to claim 4, characterized in that stages a) and b) are determined by the processor using an artificial intelligence model. EX1003, ¶¶213-214; *see also* Claim 2, *supra*.

F. Claim 6: METHOD (500), according to claim 4, is characterized by further comprising a stage c) of determining a routine of soil management in the agricultural field (200) based on soil analyses from the agricultural field (200).

Rosen discloses the method, according to claim 4, is characterized by further comprising a stage c) of determining a routine of soil management in the agricultural field based on soil analyses from the agricultural field. EX1003, ¶215; *see* Claim 4, *supra*.

Rosen's "horticulture light can understand its horticulture environment and device ecosystem using the instruments, and perform a self-configuration to optimize its functionality to enhance growth of plants in the horticulture environment and device ecosystem." EX1005, ¶[0026]. "For example, the horticulture light can employ sensors to monitor plants in the horticulture environment, and . . . control other systems (e.g. . . . fertilizing, feeding . . . or any other suitable systems associated with horticulture) to enhance growth of the plants based on their plant characteristics . . . and/or environmental characteristics (e.g. . . . soil quality, soil moisture . . . or any other suitable characteristic associated with a horticulture environment). EX1005, ¶[0026]; EX1003, ¶216.

Rosen also teaches that:

Horticulture light 502 can include horticulture management component 504 that can enable horticulture light 502 to understand the environment in which the horticulture light 502 is installed, *determine an objective of the installation*, perform a self-configuration according to the determined objective, and operate to achieve the determined objective related to efficiently enhancing plant growth.

EX1005, ¶[0046]; EX1003, ¶217. Based on at least the disclosure of Rosen referenced herein, a POSITA would have understood that Rosen discloses determining an objective of the installation, where the objective is control of horticulture systems to enhance the growth of plants based on soil quality and moisture. To the extent that the Board determines the "determining" step is enabled, a POSITA would have understood this to constitute determining a soil management routine based on soil analyses from the agricultural field.¹¹ EX1003, ¶218; *see also*

¹¹ As explained with respect to Ground 2, *supra*, the '543 Patent does not enable certain limitations of the Challenged Claims related to "determining" various routines. §IX, *supra*. To the extent that the Board determines that the "determining" limitations are enabled and not indefinite, Rosen discloses determining routines in at least as much detail as the '543 Patent.

¶¶[0027]-[0028], [0032], [0040], [0048], [0050]-[0058], [0061], [0063], [0065]-[0066], [0072]-[0080], [0087]-[0092].

G. Claim 7: METHOD (500), according to claim 6, characterized in that stage c) of determining through the artificial intelligence model considers at least one of the following: the irrigation routine (502); the routine of artificial light(s) supplementation (503); the crop (202 a) species under cultivation; the phenological stage of the crop (202 a) under cultivation; the photoperiod, the season and the current weather conditions under which the agricultural field (200) is subjected; and the one or more objective(s) intended for the crop (202 a) development.

Rosen discloses the method, according to claim 6, characterized in that stage c) of determining through the artificial intelligence model¹² considers at least one of the following: the irrigation routine; the routine of artificial light(s) supplementation; the crop species under cultivation; the phenological stage of the crop under cultivation; the photoperiod, the season and the current weather conditions under which the agricultural field is subjected; and the one or more objective(s) intended for the crop development. EX1003, ¶219; *see also* Claims 4, 6, *supra*.

¹² As explained with respect to Ground 1, *supra*, Claim 6 the '543 Patent does not recite an "artificial intelligence model." VIII.C, *supra*. Regardless, to the extent that the Board determines Claim 7 is not indefinite, a POSITA would have understood Rosen's artificial intelligence model would have been implemented for the "determining" step of Claims 6 and 7. EX1003, ¶219 n.8; *see also* Claim 5, *supra*.

Although only one category is required to render the Challenged Claims obvious—in light of the fact that the claim language refers to "at least one of the following"—Rosen discloses stage c) of determining considers at least each of (1) the irrigation routine; (2) the routine of artificial light(s) supplementation; (3) a crop species under cultivation; (4) the phenological stage of the crop under cultivation; (5) the photoperiod, a season and current weather conditions under which the agricultural field is subjected; and (6) one or more objective(s) intended for the crop development. EX1003, ¶220.

The irrigation routine. Rosen discloses that "best practices component 606 can aggregate, from horticulture lights 502 installed in various environments, information, such as objectives, images, audio recordings, sensor readings (e.g. humidity, temperature, ambient lighting, *soil moisture, soil chemistry*, air quality, water quality, or any other suitable sensor reading), and actions performed (e.g. *watering operations*, fertilizing operations, lighting output operations, HVAC operations, audio output operations, or any other suitable actions performed. Best practices component 606 can analyze this information using artificial intelligence to learn *actions* (e.g. light output, control of *other devices* 518, etc.) *to perform by horticulture light* 502 *to affect characteristics of a particular plant type at a particular stage of plant growth in a particular environment to meet a defined objective.*," EX1005, ¶¶[0094]; EX1003, ¶221.

A POSITA would have understood the soil management routine of Claim 6 constitutes "actions" regarding control of "other devices" referenced by Rosen. A POSITA would have further understood that Rosen teaches the use of an irrigation routine as at least one consideration by an "artificial intelligence model" to determine the soil management routine of Claim 6. EX1003, ¶222.

The routine of artificial light(s) supplementation. Rosen discloses that "best practices component 606 can aggregate, from horticulture lights 502 installed in various environments, information, such as objectives, images, audio recordings, sensor readings (e.g. humidity, temperature, ambient lighting, *soil moisture, soil chemistry*, air quality, water quality, or any other suitable sensor reading), and actions performed (e.g. watering operations, fertilizing operations, *lighting output operations*, HVAC operations, audio output operations, or any other suitable actions performed. Best practices component 606 can analyze this information using artificial intelligence to learn *actions* (e.g. light output, control of *other devices* 518, etc.) to perform by horticulture light 502 to affect characteristics of a particular plant type at a particular stage of plant growth in a particular environment to meet a defined objective." EX1005, ¶¶[0094]. EX1003, ¶223.

A POSITA would have understood the soil management routine of Claim 6 constitutes "actions" regarding the control of "other devices" referenced by Rosen. A POSITA would have further understood that Rosen teaches the use of artificial light(s) supplementation routine as at least one consideration by an "artificial intelligence model" to determine the soil management routine of Claim 6. EX1003, ¶224.

The crop species under cultivation. Rosen discloses that its "horticulture light can employ sensors to monitor plants in the horticulture environment, and . . . control other systems . . . to enhance growth of the plants based on their plant characteristics (e.g. *type of plant*, stage of growth . . . or any other suitable characteristics associated with the plants)." EX1005, ¶¶[0026]-[0028]; *see also id.*, ¶¶[0061]-[0069]; EX1003, ¶225. A POSITA would have understood the soil management systems of Claim 6 are the "other systems" referenced by Rosen. EX1003, ¶225.

The phenological stage of the crop under cultivation. Rosen discloses that its "horticulture light can employ sensors to monitor plants in the horticulture environment, and . . . control other systems . . . to enhance growth of the plants based on their plant characteristics (e.g. type of plant, *stage of growth*. . . or any other suitable characteristics associated with the plants)." EX1005, ¶¶[0026]-[0028]; *see also id.*, ¶¶[0061]-[0069]; EX1003, ¶226. A POSITA would have understood the soil management systems of Claim 6 are the "other systems" referenced by Rosen. EX1003, ¶226.

Case No. PGR2025-00055 U.S. Patent No. 12,089,543 B2

The photoperiod, the season and the current weather conditions under which the agricultural field is subjected. Rosen discloses its "computer executable components can comprise: a monitoring component that employs at least one instrument of the one or more instruments to monitor at least one characteristic of a defined region in which at least one plant is planted in a horticulture environment in which horticulture light bulb is installed; and an operation component that: determines at least one action for the horticulture light bulb to perform based on a state of the at least one characteristic." EX1005, ¶¶[0004]-[0006]; see also id., ¶¶[0026]-[0028] ("horticulture light can employ sensors to monitor plants in the horticulture environment, and customize light output and/or control other systems to enhance growth of the plants based on ... environmental characteristics (e.g. temperature, humidity, ambient lighting, air quality, water quality, soil quality, soil moisture, pests, location, location relative to other plants, ambient sounds, or any other suitable characteristic associated with a horticulture environment)"); ¶¶[0061]-[0069]; EX1003, ¶227.

A POSITA would have understood the "environmental characteristics" disclosed by Rosen to include "photoperiod", "season" and "current weather conditions" for the field. Specifically, a POSITA would have understood that ambient lighting refers to the total light available in the plant's environment, from

77

both natural and artificial sources, and therefore encompasses a "photoperiod." EX1003, ¶228.

<u>One or more objective(s) intended for the crop development.</u>¹³ Rosen discloses that its "computer executable components can comprise . . . and an operation component that: determines at least one action for the horticulture light bulb to perform based on . . . at least one objective of the installation of the horticulture light bulb in the horticulture environment." EX1005, ¶¶[0004]-[0006]; *see also id.*, ¶[0025] ("efficiency can be based on an objective . . . of the horticulture environment defined by a user and/or the system"); ¶[0031] ("All examples below can involve coordination amongst a set of horticulture lights to achieve a horticulture

¹³ As explained in Section VIII.B, *supra*, Claim 7 is subject to indefiniteness challenges. Specifically, this limitation is indefinite because it is "purely subjective and depend[] on the unpredictable vagaries of any one person's opinion [are] indefinite." *Intellectual Ventures I LLC v. T-Mobile USA, Inc.*, 902 F.3d 1372, 1381 (Fed. Cir. 2018). To the extent that the Board determines this element is not indefinite, a POSITA would have understood that stage c) is implemented by Rosen's processor while considering "at least one objective of the installation of the horticulture light" as explained herein. EX1005, ¶¶[0004]-[0006]; *see also* EX1003, ¶229 n.9.

objective, whether explicitly stated or not."); ¶¶[0043]-[0044], [0061]-[0069]; Fig. 5; EX1003, ¶229.

XII. GROUND 5: CLAIMS 1-7 OF THE '543 PATENT ARE OBVIOUS UNDER 35 U.S.C. § 103 OVER RICHARDVILLE IN VIEW OF ROSEN

Claims 1-7 are obvious under 35 U.S.C. §103 over Richardville in view of Rosen. Richardville (EX1007) was not considered during prosecution of the '543 patent and is more material than the prior art considered. EX1002; EX1003, ¶¶230-231.

A. Motivation to Combine

Rosen discloses an agricultural device positioned on an agricultural field in the cultivation of a crop species. Specifically, Rosen discloses a "horticulture light [that] can understand its horticulture environment and device ecosystem . . . and perform a self-configuration to optimize its functionality to enhance growth of plants in the horticulture environment and device ecosystem." EX1005, ¶[0026]. Rosen provides examples of an applicable "horticulture environment," including a "grow room, greenhouse, *field*, indoor environment, *outdoor environment*, liquid environment, or any other suitable horticulture environment." EX1005, ¶¶[0024], [0059], [0062]; EX1003, ¶232.

Rosen also teaches that its "horticulture light can employ sensors to monitor plants in the horticulture environment, and customize light output and/or control other systems (e.g. temperature, humidity, *watering*, fertilizing, feeding, pollination, insect repellent, sound, air flow, air quality, windows, robots, or *any other suitable systems associated with horticulture*)." EX1005, ¶¶[0026], [0048]. A POSITA would have understood that a modular irrigation pivot was a "suitable systems associated with horticulture" for use in a horticulture environment such as a field. EX1003, ¶233.

Rosen additionally teaches that its "[h]orticulture light 100 comprises a horticulture light bulb 102 which can be installed as a retrofit into a socket 116 of conventional light fixture 114." EX1005, ¶[0034]; EX1003, ¶234.

Richardville discloses "[a] light assembly mounted to a span of an irrigation system. The light assembly includes at least one bracket, at least one extension, and a light bar." EX1007, Abstract. Specifically, Richardville discloses a "center pivot type irrigation system" which includes "one or more spans," "one or more drive units," and "one or more pivot legs." EX1007, ¶¶[0014], [0019]; EX1003, ¶235. Richardville also teaches its "[t]he light bar 320 includes one or more grow lights 410 to aid in crop growth when sun exposure is low. The grow lights 410 may be of the Light Emitting Diode (LED) type, the High Intensity Discharge (HID) type, the fluorescent type, and/or the plasma type." EX1007, ¶[0028]; EX1003, ¶236.

Richardville also teaches that "logic may be implemented into the light assembly control panel 340 to monitor the environment for sunlight. When sunlight is not available the logic may command that power be applied to the light assembly 305. In this configuration the light timers 335 are unnecessary and the process becomes more autonomous." EX1007, $\P[0026]$; *see also id.*, $\P[0033]$ ("An example of a logic flowchart 800 is shown in FIG. 8. The logic flowchart 800 gives an example of the operational logic behind the intended light assembly usage. The logic flowchart 800 has separate pathways for grow light applications and sprinkler applications. The individual pathways allow the grow lights and the sprinkler system to run independently of each other."). EX1003, $\P237$.

A POSITA would have understood that Richardville's "light assembly mounted to a span of an irrigation system" is precisely the type of "suitable systems associated with horticulture" that was envisioned by Rosen. EX1003, ¶238. For at least these reasons, a POSITA would have been motivated to implement Rosen's horticulture light bulb (including the processors and other software components associated with Rosen's horticulture light bulb) into the light assembly and pivotlike irrigation system disclosed by Richardville, in order to provide additional "logic" to increase the autonomy of Richardville's light assembly and pivot-like irrigation system. EX1003, ¶238.

Additionally, because Rosen discloses that its horticulture light bulb can be installed as a retrofit into the socket of a conventional light fixture, a POSITA would have had a reasonable expectation that the proposed combination would have been successful. EX1003, ¶239.

B. Claim 1:

1. 1.Pre: AGRICULTURAL MANAGEMENT SYSTEM (100) is characterized by comprising:

Rosen discloses an agricultural management system. See Ground 4, Claim 1.Pre, above.

Richardville also discloses an agricultural management system. EX1007, ¶¶[0033]-[0040], Fig. 8; EX1003, ¶241.

A person of ordinary skill in the art would have understood that the combination of Rosen's horticulture light bulb (including the processors and other software components associated with Rosen's horticulture light bulb) and the light assembly and pivot-like irrigation system disclosed by Richardville constitutes an agricultural management system. EX1003, ¶242.

2. 1.A: a modular agricultural irrigation pivot-like device (101) positioned on an agricultural field (200) in the cultivation of a crop (202 a) species, the modular agricultural irrigation pivotlike device (101) comprising:

Richardville in view of Rosen discloses a modular agricultural irrigation pivot-like device positioned on an agricultural field in the cultivation of a crop species. *See* Ground 4, Claim 1.A, *supra*; *see also* EX1003, ¶243.

To the extent that Rosen does not disclose or otherwise render obvious Claim 1.A, Richardville discloses a modular agricultural irrigation pivot-like device positioned on an agricultural field in the cultivation of a crop. EX1007, ¶[0014] ("FIG. 1 shows *an example of a center pivot type irrigation system 100*, the center pivot type irrigation system 100 has a pivot point 105, *one or more spans 110*, and one or more drive units 115."); *see also id.*, Figs. 1-3; EX1003, ¶244. Based on Richardville's disclosure of a pivot-type irrigation system with "one or more spans" and "one or more drive units," a POSITA would have understood that Richardville discloses a modular system. EX1003, ¶245.

a. 1.A.i: a plurality of artificial lighting sources (10 a, 10 b, 10 c, 10 d, 10 e) arranged along the modular agricultural irrigation pivot-like device (101) at a predetermined distance above the aerial parts of the crop (202 a), comprising a plurality of light-emitting diodes; and

Richardville in view of Rosen discloses a plurality of artificial lighting sources arranged along the modular agricultural irrigation pivot-like device at a predetermined distance above the aerial parts of the crop, comprising a plurality of light-emitting diodes. EX1003, ¶246; *see* Ground 4, *supra*.

Richardville also discloses a plurality of artificial lighting sources arranged along the modular agricultural irrigation pivot-like device at a predetermined distance above the aerial parts of the crop, comprising a plurality of light-emitting diodes. EX1003, ¶247. Richardville teaches its "light bar 320 includes one or more grow lights 410 to aid in crop growth when sun exposure is low. The grow lights 410 may be of the Light Emitting Diode (LED) type, the High Intensity Discharge (HID) type, the fluorescent type, and/or the plasma type." EX1007, ¶[0028]; EX1003, ¶247. Specifically, Richardville discloses that its "light assembly 305 includes one or more brackets 310, one or more extensions 315, and a light bar 320. The bracket 310 is configured to surround the span 110 and attaches via clamping force. Descending from the bracket is the extension 315. The extension 315 is variable along its length. For example, the extension may be set to allow for the light bar 320 to hang anywhere from 1-10 meters above the ground. In an example embodiment, the light bar 320 is hung approximately 3.5 meters above the ground. In another embodiment, the light bar 320 is hung approximately 3.5 meters above the top of the *crop*." EX1007, ¶[0024]; EX1003, ¶248.

As explained above, a POSITA would have been motivated to implement Rosen's horticulture light bulb (including the processors and other software components associated with Rosen's horticulture light bulb) into the light assembly and pivot-like irrigation system disclosed by Richardville. EX1003, ¶249; §XII.A, *supra*.

a. 1.A.ii: a plurality of energy sources that feed the plurality of artificial lighting sources (10 a, 10 b, 10 c, 10 d, 10 e),

Richardville in view of Rosen discloses a plurality of energy sources that feed the plurality of artificial lighting sources. EX1003, ¶250; *see* Ground 4, *supra*. Specifically, Rosen teaches that its "horticulture light 100, 200 can have a plurality of different power sources, with one or more power sources acting as a backup for another power source." EX1005, ¶[0039]; *see also* EX1003, ¶251.

Richardville teaches that its "light assembly 305 may be powered independent of the irrigation system." EX1007, ¶[0026]; EX1003, ¶252. A POSITA would have been motivated to implement the plurality of different power sources, with one or more power sources acting as a backup—as disclosed by Rosen—into the light assembly and irrigation system disclosed by Richardville. Richardville discloses multiple energy sources for both its light assembly and irrigation system. A POSITA would have understood that implementing backup power sources helps to prevent potential damage or loss to crops caused by power disruptions from a primary power source. EX1003, ¶253. **3. 1.B: the agricultural management system (100) further comprising:**

a. 1.B.i: a processor in communication with a dimerizer and/or a polarizer of the plurality of artificial lighting sources (10 a, 10 b, 10 c, 10 d, 10 e) and with the plurality of energy sources, wherein the processor is configured to:

b. 1.B.ii: a) adjust (501), in the intervals of the electromagnetic spectrum, the balance between the spectral bands emitted by the plurality of light-emitting diodes; and

c. 1.B.iii: b) determine and implement: an irrigation routine (502); and/or an artificial light(s) supplementation routine (503);

d. 1.B.iv: wherein stages a) and b) are determined by the processor considering at least one among: a crop (202 a) species under cultivation; a phenological stage of the crop (202 a) under cultivation; a photoperiod, a season and current weather conditions under which the agricultural field (200) is subjected; and one or more objective(s) intended for the crop (202 a) development.

Richardville in view of Rosen discloses limitations 1.B, 1.B.i, 1.B.ii, 1.B.iii,

and 1.B.iv. See, Ground 4, supra. EX1003, ¶254.

Specifically, Rosen discloses that its "horticulture light bulb comprises one or more instruments, a memory that stores computer executable components, and a processor that executes the computer executable components stored in the memory." EX1005, ¶[0004]; *see also* EX1005, ¶¶[0005]-[0006]. A POSITA would have understood that Rosen's processor would have been in electrical communication with the disclosed plurality of energy sources, in order to provide power to the processor. §XII.B.2.a; EX1003, ¶255-256.

Because Rosen's processor is associated with its horticulture light bulb, and because the proposed combination of Richardville in view of Rosen implements Rosen's horticulture light bulb, a POSITA would have understood that the combination of Richardville's light assembly and pivot-like irrigation system with Rosen's horticulture light bulb (including the processors and other software components associated with Rosen's horticulture light bulb) would have disclosed or otherwise rendered obvious limitations 1.B, 1.B.i, 1.B.ii, 1.B.iii, and 1.B.iv. *See,* Ground 4; EX1003, ¶257; §XII.A, *supra.*

C. Claim 2: SYSTEM (100), according to claim 1, characterized in that stages a) and b) determined by the processor using an artificial intelligence model.

Richardville in view of Rosen discloses the system, according to claim 1, characterized in that stages a) and b) [are] determined by the processor using an artificial intelligence model. *See* Claim 1, *supra*; *see also* Ground 4, Claim 2 *supra*; EX1003, ¶258.

As explained with respect to claim elements 1.B-1.B.iv, *supra*, because Rosen's processor is associated with its horticulture light bulb, and because the proposed combination of Richardville in view of Rosen implements Rosen's horticulture light bulb, a POSITA would have understood that the combination of Richardville's light assembly and pivot-like irrigation system with Rosen's horticulture light bulb (including the processors and other software components associated with Rosen's horticulture light bulb) would have disclosed or otherwise rendered obvious that stages a) and b) determined by the processor using an artificial intelligence model. *See,* Ground 4, Claim 2, *supra; see also* EX1003, ¶259; §XII.A, *supra.*

D. Claim 3:

1. **3.Pre: SYSTEM (100), according to claim 1, characterized in that the modular agricultural irrigation pivot-like device (101) comprises:**

Richardville in view of Rosen discloses the system according to claim 1. See

Claim 1.A, supra; see also Ground 4, Claim 1, supra.

2. 3.A: a drive device for the displacement of the modular agricultural irrigation device (101) over the agricultural field (200); and

Richardville in view of Rosen discloses a drive device for the displacement of the modular agricultural irrigation device over the agricultural field. *See* Ground 4, Claim 3.A, *supra*; *see also* EX1003, ¶261.

To the extent that Rosen does not disclose or otherwise render obvious Claim 1.A, Richardville discloses a drive device for the displacement of the modular agricultural irrigation device over the agricultural field. EX1007, ¶[0014] ("FIG. 1 shows an example of a center pivot type irrigation system 100, the center pivot type irrigation system 100 has a pivot point 105, one or more spans 110, and *one or more drive units 115.*"); *see also id.*, Figs. 1-3; EX1003, ¶262.

3. **3.B:** sprinkler devices comprising a plurality of sprinklers,

Richardville in view of Rosen discloses sprinkler devices comprising a plurality of sprinklers. *See* Ground 4, Claim 3.B, *supra*; *see also* EX1003, ¶263.

To the extent that Rosen does not disclose or otherwise render obvious Claim 1.A, Richardville discloses sprinkler devices comprising a plurality of sprinklers. EX1007, ¶[0014] ("The one or more spans 110, including the first span 135, further include *at least one sprinkler 190.*"); *see also id.*, Figs. 1-3, ¶[0020] ("Located on the spans 205 are one or more sprinklers 220. The one or more sprinklers 220 serve to distribute the water from inside the spans to the surrounding crops."); EX1003, ¶264. A POSITA would have understood that each "span" contains a "sprinkler device" comprising multiple "sprinklers" 190. EX1003, ¶265.

Case No. PGR2025-00055 U.S. Patent No. 12,089,543 B2



FIG. 2

1. **3.C:** wherein the processor is in communication with the drive device and with the sprinkler device for the execution of stage b).

Richardville in view of Rosen discloses wherein the processor is in communication with the drive device and with the sprinkler device for the execution of stage b). EX1003, ¶266.

Specifically, Rosen discloses that its "horticulture light bulb comprises one or more instruments, a memory that stores computer executable components, and a processor that executes the computer executable components stored in the memory." EX1005, ¶[0004]; *see also* EX1005, ¶¶[0005]-[0006]; EX1003, ¶267.

Because Rosen's processor is associated with its horticulture light bulb, and because the proposed combination of Richardville in view of Rosen implements Rosen's horticulture light bulb, a POSITA would have understood that the combination of Richardville's light assembly and pivot-like irrigation system with Rosen's horticulture light bulb (including the processors and other software components associated with Rosen's horticulture light bulb (software) would have understood that the software implemented Rosen's processor. EX1003, ¶268; §XII.A, *supra*.

Rosen discloses that its processor is in communication with the drive device and with the sprinkler device for the execution of stage b). *See,* Ground 4, Claim 3.C, *supra*. A POSITA would have understood that when Rosen's processor and horticulture light bulb are implemented with Richardville's light assembly and pivotlike irrigation system—which includes a drive device and a sprinkler device—that Rosen's processor would have been in communication with said drive device and sprinkler device while determining and implementing irrigation and/or artificial light supplementation routines. EX1003, ¶269; §XII.A, *supra*.

E. Claims 4-7

Claims 4-7 relate to various agricultural management methods, and are disclosed or otherwise rendered obvious by Rosen. *See,* Ground 4, Claims 4-7, *supra*; EX1003, ¶270-271.

91

Case No. PGR2025-00055 U.S. Patent No. 12,089,543 B2

XIII. CONCLUSION

For the foregoing reasons, Petitioner respectfully requests cancellation of the Challenged Claims.

Dated: June 16, 2025

Respectfully submitted, /Thomas F. Finch/ Thomas F. Finch (Reg. No. 82,341)

Attorney for Petitioner Almendra Pte. Ltd.
Case No. PGR2025-00055 U.S. Patent No. 12,089,543 B2

CERTIFICATE OF SERVICE

In accordance with 37 C.F.R. §§ 42.6(e), 42.105 the undersigned certifies that on June 16, 2025, a complete and entire copy of the foregoing Petition for Post-Grant Review of U.S. Patent No. 12,089,543 including all Exhibits and the Power of Attorney will be served via Federal Express Overnight Mail electronically by agreement to the following attorney of record for the '543 Patent:

POLSINELLI (DC OFFICE), PO Box 140310, Kansas City, MO 64114-0310.

Dated: June 16, 2025

Respectfully submitted, /Thomas F. Finch/ Thomas F. Finch (Reg. No. 82,341)

Attorney for Petitioner Almendra Pte. Ltd.

CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(a)(1)(ii), the undersigned certifies that the foregoing Petition for Post-Grant Review, including footnotes, contain 18,070 words according to Microsoft Word. This is less than the limit of 18,700 words as specified by 37 C.F.R. § 42.24(a)(1)(ii).

Dated: June 16, 2025

Respectfully submitted, /Thomas F. Finch/ Thomas F. Finch (Reg. No. 82,341)

Attorney for Petitioner Almendra Pte. Ltd.