UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SYNGENTA CROP PROTECTION
AG,
Petitioner,

v.

Inflexion Point Technologies, LLC,
Patent Owner.

Case PGR2025-00045
Patent 12,102,027

PETITION FOR POST GRANT REVIEW

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EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 12,102,027 to Smith et al., entitled "System and Method for Prescriptive Seed Treatment," filed June 23, 2015
1002	Selected Excerpts of the File History of the '027 Patent
1003	Declaration of Durham K. Giles, Ph.D.
1004	Wagers et al., "Multi-Seed Planter Control System and Method for the Same," US2014/0277959, published on September 18, 2014 ("Wagers")
1005	Mitchell, "Antismut Grain and Soil Treating Process and Apparatus," U.S. Patent No. 1,409,564, issued on March 14, 1922
1006	Wilkerson et al., "Systems and Methods for Fluid Dispensing," US2004/0231575, published on November 25, 2004 ("Wilkerson")
1007	Batcheller et al., "Method and System for Optimizing Planting Operations," US2014/0379228, published on December 25, 2014 ("Batcheller")
1008	Memory et al., "Method and Apparatus for Coating Seeds," U.S. Patent No. 6,155,185, issued on December 5, 2000 ("Memory")
1009	Garner et al., "Seeding Machine with Seed Delivery System," U.S. Patent No. 8,850,995, issued on October 7, 2014 ("Garner")
1010	Bender et al., "Multiple-Type Seed Dispensing System," U.S. Patent No. 5,915,313, issued on June 29, 1999 ("Bender")
1011	Garner et al., "Planting Unit for a Seeding Machine Having Blocking Member to Control Hand-Off of Seed From a Seed Meter to a Seed Delivery System," U.S. Patent No. 8,671,856, issued on March 18, 2014 ("Garner '856")
1012	Thacker, "Vegetable Seed Planter," U.S. Patent App. Pub. No. 2016/0174458, published on June 23, 2016 ("Thacker")

1013	Wendte, "Method and Apparatus for an Agricultural Implement Seed Meter," U.S. Patent No. 7,854,066, issued on December 21, 2010 ("Wendte '066")
1014	Sauder et al., "Apparatus and Method for Controlled Delivery of Seeds to an Open Furrow," U.S. Patent No. 6,681,706, issued on January 27, 2004 ("Sauder '706")
1015	Celik, "Effects of Various Planters on Emergence and Seed Distribution Uniformity of Sunflower," Applied Engineering in Agriculture (2007) ("Celik")
1016	Liu et al., "Seed Sensory System and Method for Improved Seed Count and Seed Spacing," U.S. Patent App. Pub. No. 2010/0116974, published on May 13, 2010 ("Liu")
1017	Sauder et al., "Seed Tube Egress-Mounted Seed Sensor," U.S. Patent No. 8,631,749, issued on January 21, 2014 ("Sauder '749")
1018	Knake, "Apparatus for Spray-Treating Seeds During Planting," U.S. Patent No. 4,356,934, issued on Novembfer 2, 1982 ("Knake")
1019	Hancock, John H., "Design and Evaluation of a Seed-Specific Applicator for In-Furrow Chemical Application," University of Tennessee, 2003 ("Hancock")
1020	Grimm et al., "System and Method for Spraying Seeds Dispensed From a Planter," U.S. Patent No. 9,226,442, issued on January 5, 2016 ("Grimm")
1021	Downey et al., "Pulsed-Jet Microspray Applications for High Spatial Resolution of Deposition on Biological Targets," Atomization and Sprays, Vol. 14, pp. 93-109 (2004) ("Downey")
1022	Cloeter et al., "Planar Laser Induced Fluorescence (PLIF) Flow Visualization applied to Agricultural Spray Nozzles with Sheet Disintegration; Influence of an Oil-in-Water Emulsion," ILASS-Americas 22nd Annual Conference on Liquid Atomization and Spray Systems, Cincinnati, OH (2010) ("Cloeter")

1023	Nielsen, "Don't Let the Planter Hold Back Your Corn Yields," Purdue University, published January 4, 1996 ("Nielsen")
1024	Kocher et al., "Corn Seed Spacing Uniformity as Affected by Seed Tube Condition," Biological Systems Engineering: Papers and Publications (2011) ("Kocher")
1025	Selected Excerpts of the File History of Eur. Patent App. No. 3967120, filed on June 23, 2015
1026	"John Deere Debuts New Planting Technology & Electric Excavator During CES 2023 Keynote," John Deere, published on January 5, 2023
1027	Garner et al., "Seeding Machine for Planting Multiple Seed Varieties and Prescription for Multiple Varieties Seeding Machine," U.S. Patent No. 8,942,894, issued on January 27, 2015 ("Garner '894")
1028	Wendte et al., "Multiple Seed-Type Planter with On-Row Selector Assembly," U.S. Patent No. 9,648,802, issued on May 16, 2017 ("Wendte '802")
1029	Giles, D. Ken et al., "Liquid Property and Nozzle Effects on Flight Time of Pulsed Jet Spray." *Atomization and Sprays*, vol. 14, no. 2 (2004) ("Giles")
1030	Declaration of Sylvia D. Hall-Ellis, PhD

I. INTRODUCTION

In accordance with 35 U.S.C. §§ 321-329 and 37 C.F.R. § 42.200 et seq., Syngenta Crop Protection AG ("Petitioner") requests Post Grant Review of claims 1-19 of United States Patent No. 12,102,027 to Smith et al., titled "System and Method for Proscriptive Seed Treatment" ("the '027 Patent"; Ex 1001"), owned by Inflexion Point Technologies, LLC. This Petition demonstrates that Petitioner is more likely than not to prevail in invalidating at least one of the challenged claims.

II. REQUIREMENTS PURSUANT TO 37 C.F.R. § 42.204

A. Grounds for Standing

Petitioner certifies that the '027 Patent is eligible for Post-Grant Review ("PGR") and that Petitioner is not barred or estopped from requesting PGR challenging the claims of the '027 Patent on the grounds identified in this Petition.

B. Timing

The '027 Patent was granted on October 1, 2024, and this Petition is being filed on or before the date that is nine months after the date of grant of the patent, or on or before July 1, 2025. *See* (Ex. 1001). As discussed in Section V.A, the '027 Patent is subject to the AIA and is eligible for PGR because the effective filing date of the claims is after March 16, 2013.

Pursuant to 35 U.S.C. § 325(d), the prior art and arguments presented in this Petition are not the same or substantially the same prior art or arguments

previously presented to the Office. The anticipation argument of Ground 1 was not previously raised by the Examiner as the Examiner was unaware of the Wagers reference. As a result, Wagers is not in the record of the ’027 Patent. In addition, the obviousness arguments of Grounds 2 through 6 over Wagers in view of Mitchell, Wilkerson, Batcheller, Memory, and Garner were not previously raised by the Examiner. In addition to being unaware of Wagers, the Examiner was unaware of Mitchell, Batcheller, Memory, and Garner. As a result, none of those prior art references are in the record of the ’027 Patent. While the Examiner was aware of and cited a Wilkerson reference related to that asserted here, the Examiner did not combine Wagers with Wilkerson to find obviousness. Ex. 1002, 309-14; 316-18; 360-62; 365-72.

III. MANDATORY NOTICES PER 37 C.F.R. § 42.8

A. Real Party-In-Interest

The real party-in-interest for this Petition is Syngenta Crop Protection AG, a corporation organized under the laws of Switzerland with its principal offices in Basel, Switzerland (“Petitioner”). While not a real party-in-interest, Syngenta AG owns 100% of Syngenta Crop Protection AG; Syngenta Group owns 100% of Syngenta AG; China National AgroChemical Company Ltd. Owns 100% of Syngenta Group; and Sinochem owns 100% of China National AgroChemical Company Ltd.

B. Notice of Related Matters

Pursuant to 37 C.F.R. § 42.8(b)(2), Petitioner notices the following related U.S. application in as much as the application claims priority to the '027 Patent:

- U.S. App. Ser. No. 18/598,879 filed March 7, 2024, which claims priority to U.S. App. No. 15/739,606 application, which issued as the '027 Patent.

Petitioner is also aware of the following applications to which the '027 Patent claims priority:

- PCT/US2015/037230 filed on June 23, 2015

C. Lead, Back-up Counsel and Service Information

Pursuant to 37 C.F.R. §§ 42.8(b)(3) and 42.109(a), Petitioner designates counsel as follows:

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mrick@bakerlaw.com. Pursuant to 37 C.F.R. § 42.10(b), a Power of Attorney accompanies this Petition.

IV. IDENTIFICATION OF CHALLENGE UNDER 37 C.F.R. § 42.204(B) AND PRECISE RELIEF REQUESTED

Ground 1: Petitioner challenges claims 1-4, 6, 7, 11, 13-16 and seeks a ruling they are unpatentable under 35 U.S.C. § 102 as anticipated by Wagers.

Ground 2: Petitioner challenges claims 1-7, 11-16 and seeks a ruling they are unpatentable under 35 U.S.C. § 103 as obvious in view of Wagers and Mitchell.

Ground 3: Petitioner challenges claim 8 and seeks a ruling it is unpatentable under 35 U.S.C. § 103 as obvious in view of Wagers and Wilkerson.

Ground 4: Petitioner challenges claims 9 and 10 and seeks a ruling they are unpatentable under 35 U.S.C. § 103 as obvious in view of Wagers and Batcheller.

Ground 5: Petitioner challenges claim 17 and seeks a ruling it is unpatentable under 35 U.S.C. § 103 as obvious in view of Wagers and Memory.

Ground 6: Petitioner challenges claims 18 and 19 and seeks a ruling they are unpatentable under 35 U.S.C. § 103 as obvious in view of Wagers and Garner.

Ground 7: Petitioner challenges claims 1-19, and seeks a ruling they are unpatentable under 35 U.S.C. § 112(a) for lack of enablement.

Petitioner relies upon publications cited therein in support of Grounds 1-7, and upon the Declaration of Durham Kenneth Giles, Ph.D., Ex. 1003, and the

documents cited therein. Filed herewith is an Exhibit List and copies of the references, per 37 C.F.R. § 42.63(e) and 37 C.F.R. § 42.6(c).

V. Background

A. The ’027 Patent

1. Specification and Claims

As the title “System and Method for Prescriptive Seed Treatment” of the ’027 Patent implies, the ’027 Patent is purportedly directed to “an improved method for prescriptive seed treatment …” Ex. 1001, title, abstract. The ’027 Patent is directed to a seed treatment method for a planter including calculating a planting location in a field, selecting a combination of a seed type and a substance to apply to the seed, calculating an application amount of the substance, which can vary on the planting location, and applying the substance to each seed while delivering the treated seed to the planting location. Ex. 1003, ¶ 47; Ex. 1001, claim 1.

The seed treatment method of the ’027 Patent purports to provide “precise selection of which seed and the type and amount of seed treatment substances that should be planted in a particular location,” where “calculating” a location may be based on “visual observation, GPS coordinates” or “prescription field maps.” Ex. 1001, 4:3-12; 28:56-61. Furthermore, the seed treatment method of the ’027 Patent is “based at least in part on a condition” or “any circumstance that can impact what seed to be planted at a particular location and/or the type and/or amount of seed

applied substance(s) applied to such seed." *Id.*, 8:27-33. Furthermore, the '027 Patent characterizes "planter" as including "past planters, currently existing planters, future planters and other current and future equipment used in the planting process." *Id.*, 7:25-30.

The '027 Patent contains 19 claims. *Id.*, 39:41-41:25. Claim 1 is an independent claim from which the remaining claims depend. *Id.*

2. Prosecution History

The '027 Patent was filed as a Patent Cooperation Treaty ("PCT") application on June 23, 2015, and entered under 35 U.S.C. § 371 as Application No. 15/739,606 ("the '606 Application") on December 22, 2017. Ex. 1001, cover. The '606 application claimed priority to PCT application No. PCT/US2015/037230 filed June 23, 2015. *Id.*

In the first office action issued April 30, 2020, the Examiner rejected then-pending claims 1-5, 7-11, 13-18, and 20-27 as anticipated by Fick (U.S. Patent No. 5,931,882). Ex. 1002, 99-110. The Examiner also rejected claims 3-8 as obvious over Fick in view of Wendte (US2015/0223391); claim 6 as obvious over Fick in view of Bender (U.S. Patent No. 5,915,313); and claims 12 and 19 as obvious over Fick in view of Knake (U.S. Patent No. 5,356,934). *Id.*

In its response of October 30, 2020, the Applicant merely asserted, with no explanation, that the "patent cited in the office action does not teach all the

elements." Ex. 1002, 115-23. As for the Examiner's 103 rejection, the Applicant reiterated its conclusory response to the 102 rejection and added—again with no explanation or discussion—that there was "no motivation to combine" the references. *Id.* The Examiner issued a final office action February 2, 2021, maintaining her rejections based on the same prior art. *Id.*, 133-44.

In its next response, submitted May 3, 2021, the Applicant attempted to distinguish its claims from Fick by focusing on the claim limitation "generating the combination of the seed and seed-applied substance prior to the combination being planted at the location," and arguing: Fick "applies chemicals simultaneously with the planting of seeds in the field." Ex. 1002, 154-67; "Noticeably absent from Fick is any teaching that a fertilizer or insecticide is applied to a seed." (*Id.*, 156); "Fick does not apply a seed-applied substance to a seed and then plant the treated seed." (*Id.*). In terms of the 103 rejection, the Applicant simply asserted that the additional prior art did not cure the deficiencies of Fick. *Id.*, 162-66.

In the Examiner's next Office Action of August 5, 2021, the Examiner dropped the 102 rejection and the Fick reference, issuing a new 103 rejection of claim 1 based on Bardi (U.S. Patent No. 6,148,748) in view of Wendte. Ex. 1002, 172-83. The Examiner made a second 103 rejection of claims 2-8, 13-14, 17, 21, and 25-27 relying on Bardi, Wendte and Ochampaugh (US2013/0121101) and

further 103 rejections of additional dependent claims based on those references in combination with others. *Id.*

On November 4, 2021, the Applicant filed a response, focusing on air travel in Bardi and culminating in the statement that Bardi "would necessarily require engineering modifications of the apparatus." Ex. 1002, 185-220. The Applicant further stated that "'the inline mixing chamber 22' of Bardi is for mixing seed and treatment fluid, but not applying a determined amount of the seed-applied substance to a seed" *Id.*, 283. Finally, the Applicant emphasized that "the combination of Bardi and Wendte provides a system that has to change out modules for different seed after each use…." *Id.*, 290.

The Examiner responded February 16, 2022, rejecting all claims under 35 U.S.C. 112(a) as lacking written description, noting it is "unclear where the support for the new limitations particularly the combination of the seed and seed-applied substance can vary as the planter changes location." Ex. 1002, 227. The Examiner also maintained both 103 rejections of the claims. *Id.*, 228-39. She addressed Applicant's assertion that the Bardi/Wendt combination would require changing modules for different seeds, noting the claim "simply requires generating a combination from seed and seed-applied substance" and that the claims "do not preclude switching out modules for different types of seeds." *Id.*, 237.

There was then an Examiner Interview held on, March 28, 2022, with the Examiner Interview Summary mailed on April 26, 2022. Ex. 1002, 245-47. The Examiner's Interview Summary for March 28, 2022 notes a number of new statements by Applicant as to the purported invention, including: (1) "the prior art of record are mainly directed to "macro seed application, whereas the Applicant's invention is directed to micro seed application;" (2) the "invention uses a micro nozzle that deposits pico scale amounts to the seed;" (3) the "invention can be adjusted in real time;" and (4) the "applicant's portable nozzle is located near the seed drop chute, where the seed is place[d] right before the nozzle before dropping to the soil." *Id.* The Examiner rejected these arguments, pointing out that such features ("prescription process, micro application, specific location for the treatment of seed…") "are not claimed." *Id.* The Applicant did not object that these aspects of the purported invention were not claimed; in fact, the Applicant agreed with the Examiner's Interview Summary in its response of August 16, 2022. *Id.*, 265.

The Applicant's August 16, 2022 response argued that the then-pending claims were directed to a prescriptive process and pointed to dependent claims requiring treatment of seed "proximate to the seed drop tube." Ex. 1002, 248-304. The Applicant also added new claims directed to "microscale" applications of seed-applied substance to the seed. *Id.*, 251-262. The Applicant then attempted to

distinguish the prior art based on the same arguments made in its prior response. *Id.*, 262-304.

The Examiner's office action of October 6, 2022, issued new 102 and 103 rejections of the claims based on Wilkerson (US2008/0202398) and a series of other references including Wendte; additionally, the Examiner issued a number of new 103 rejections of all pending claims. Ex. 1002, 305-19. An Examiner Interview took place December 20, 2022, and the Examiner's Interview Summary of February 7, 2023, notes the Applicant's position that Wilkerson "teaches treating the seed after being dropped in the soil." *Id.*, 322-23. The Examiner disagreed with that reading of Wilkerson and suggested possible amendments to the claims that might be helpful in distinguishing the claims over Wilkerson and "other furrow applications." *Id.* These possible amendments included: (1) "a limitation of not applying substance to the soil during the seed applying step"; (2) "include more structure of when or where the seed is treated in the system"; (3) "that the seeds are treated in a singular or singulated manner"; (4) narrowing the term "planting" to distinguish, for example, "topping the seeds with soil" versus "a simple drop to the soil from the planter" and (5) "describing the micro amount of substance being applied to the see and/or nozzle or application structure being used to coat the seeds." *Id.*

Applicant responded April 6, 2023, by maintaining most of its existing claims and amending a few claims to replace "plant"/"planting" with "delivered (or delivering) to the soil" and to specify that the combination of seed and seed-applied substance is created "between the discharge of the seed drop tube and the soil." Ex. 1002, 324-37. No other amendments suggested by the Examiner were made to the claims. The Applicant then attempted to distinguish Wilkerson primarily on the basis that, in Applicant's view, Wilkerson disclosed application of the seed-applied substance after the seeds are placed in the furrow. *Id.*, 338-56.

The Examiner responded by pointing out that, contrary to Applicant's assertion, Wilkerson disclosed more than the application after the seeds are placed in the furrow. Ex. 1002, 372-73. Citing, for example, paragraphs [0031]-[0032] of Wilkerson, the Examiner noted that the "pre-determined time" in Wilkerson for treating the seed "can be selected to be greater than or less than [the] time for the seed to reach target location, that in one option the seed will at least be partially coated or treated with the liquid prior to falling in the furrow as it is traveling to the target location." *Id.*

The Applicant responded by abandoning its effort to seek allowance of the amended original claims, canceling them all and adding new claims 36-53. Ex. 1002, 386-95. The new claims included a limitation requiring that "the delivered amount of the selected type of the seed-applied substance is greater than the

desired application amount of the selected type of the seed-applied substance and calculated to enable the substance applicator to apply the desired application amount of the selected type of the seed-applied substance to the seed." *Id.*

On May 29, 2024, the Examiner issued an office action rejecting the new claims under 35 U.S.C. 112(a) for lack of written description, finding that the new limitation—"the delivered amount … is greater than the desired application amount …" (quoted in full above)—lacked support in the application. Ex. 1002, 426-32. The Applicant attempted to overcome the rejection by pointing to language in the application that purported to support the claim limitation, but was unsuccessful. *Id.*, 444-54.

This was followed by a series of communications, including undisclosed emails, between the Applicant and Examiner that are only very cursorily documented in a single Interview Summary dated July 24, 2024. Ex. 1002, 455. This back in forth led to an Examiner's Amendment that (1) dropped the language from the independent claim found lacking descriptive support, and (2) amended the independent claim to include the language "individually applying the desired application amount of the selected type of the seed-applied substance to each seed as it is being delivered to the soil." *Id.*, 460-67. All of the remaining dependent claims were replaced with new dependent claims. *Id.* The Examiner accompanied the Amendment with statements (providing little to no explanation) that certain

identified prior art of record—namely, Knake (U.S. Patent No. 4,356,934), Bardi (U.S. Patent No. 6,148,748), Romans (U.S. Patent No. 6,216,615), and Muhr (US2002/0104262)—failed to teach the "individually applying..." limitation. *Id*. A Notice of Allowance followed on August 15, 2024. *Id.*

3. Effective Filing Date of the Claims

The '027 Patent issued from the '606 application. The earliest claimed priority date of the '606 application is to the PCT application filed June 23, 2015. Accordingly, the effective filing date of all challenged claims 1-19 is no earlier than June 23, 2015. Ex. 1001, cover. AIA Section 6(d) states that FITF provisions apply, and thus an application is PGR eligible, when an application contains claims with an effective filing date after March 16, 2013. The '027 Patent is subject to the AIA provisions of the Patent Statute and PGR eligible because all claims have an effective filing date after March 16, 2013.

B. Background of the Technology

As explained by Dr. Giles in his declaration (Ex. 1003), the '027 patent is generally directed to the field of "precision agriculture," which can be defined as "crop production practiced on a tighter spatial resolution than an entire field or geographic boundary." Ex. 1003, ¶ 38. In precision agriculture, which dates back to at least the 1990s, "the management of the crop—specifically, the types and quantities of inputs, such as irrigation water, seeds and plants, fertilizers,

pesticides, biostimulants, and even mechanical cultivation—is tailored to highly specific locations and areas in a field, even down to the single or fractional plant level of resolution." *Id.*

Precision agricultural is based on three foundational technologies, all of which were readily available as early as the mid-1990s. Ex. 1003, ¶ 39. These three technologies are: (1) "rapid, precise and accurate positioning and navigation of the agricultural implement, including sensors and actuator systems"; (2) the "software for mapping and spatial reference for data related to characteristics of a specific location on earth" known as "Geographic Information Systems (GIS)"; and (3) "sensor and mechanical actuator systems that provide the input data on soil, plant and field characteristics for the GIS and prescription creation and then implement the prescription application, e.g., rate of fertilizer applied, as the field is managed." Ex. 1003, ¶¶ 39-41.

Each of the technologies was well developed and available by the mid-1990s, providing at the time precision agricultural as a growing and commercially viable means of crop production. Ex. 1003, ¶ 42. This spurred the rapid development and availability of agricultural equipment at the time to facilitate precision agriculture. *Id.* As computing capabilities—both on-board and cloud-based—advanced, "sensor technology, particularly video imaging and processing components, became more capable and more robust, and actuator technology

became faster and more precise, leading to corresponding advancements in the speed and spatial resolution of precision agriculture." *Id.*, ¶ 44. Thus, by 2005-2007, "the fusion of GPS navigation, on-vehicle data processing, GIS-mapping and robotic technologies resulted in crop management at the individual plant level." *Id.* This trend toward precision agricultural was accompanied by parallel advancements in seed technology, which "merged as the demand for higher precision and accuracy in seed handling and placement was combined with the capabilities of highly localized crop inputs and individual seed/plant mapping to create a seed-by-seed approach to farming." Ex. 1003, ¶¶ 45-46. By at least as early as 2010, "the capabilities of precision agriculture technology were well integrated into delivery of all crop inputs at the commercial level." *Id.*

VI. THE PERSON OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art ("POSA") at the time of the earliest filing date of the '027 Patent would have had at least a Bachelor of Science degree in Agricultural or Mechanical Engineering with 5-10 years of practical, applied experience in the field of agricultural machinery, including systems integration and fluid handling and sprayer control systems. Ex. 1003, ¶ 63-65. Further, one skilled in the art would have a good understanding of sensors and actuators used in foundational technologies of precision agriculture. *Id.*

VII. CLAIM CONSTRUCTION

The challenged claims "shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b), including construing the claim in accordance with the ordinary and customary meaning in such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent." 37 C.F.R. § 42.200(b). Claim terms need to be construed only to the extent necessary to resolve a potential controversy. *Vivid Techs, Inc. v. Am. Sci. & Eng'g, Inc.,* 200 F.3d 795, 803 (Fed. Cir. 1999) The claim terms of the '027 patent should be afforded their plain and ordinary meaning as understood by one of ordinary skill in the art consistent with the scope of the terms as addressed at 7:25 to 8:57, and the remainder of the '027 patent specification. Ex. 1001, 7:25 to 8:57; Ex. 1003, ¶ 66.

VIII. IT IS MORE LIKELY THAN NOT THAT AT LEAST ONE OF THE CHALLENGED CLAIMS IS UNPATENTABLE

A. Ground 1: Claims 1-4, 6, 7, 11, 13-16 of the '027 Patent are Anticipated by Wagers

Wagers is a patent application titled "Multi-Seed Planter Control System and Method for the Same" and published September 18, 2014, as US2014/0277959. Wagers was filed on March 15, 2013. Ex. 1004, cover. Wagers constitutes prior art under 35 U.S.C. §§ 102(a)(1), (a)(2).

Wagers discloses a multi-row unit planter 104, 200 having "separate components for each of the respective row units" which include coulters, seed

metering systems, seed wheels, seed hoppers "and the like." Ex. 1004, [0028]-[0029]; Ex. 1003, ¶ 68. The multi-row unit planter also utilizes spray units for each of the row units to apply an agricultural product, such as liquid fertilizer or herbicide, stored in agricultural product reservoirs to seeds. Ex. 1004, [0028]; Ex. 1003, ¶ 68-69.

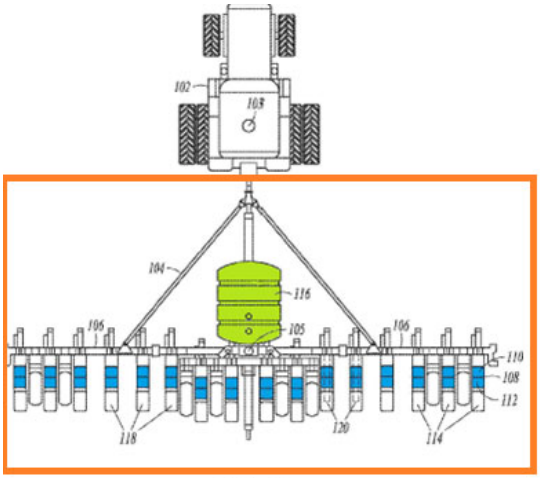
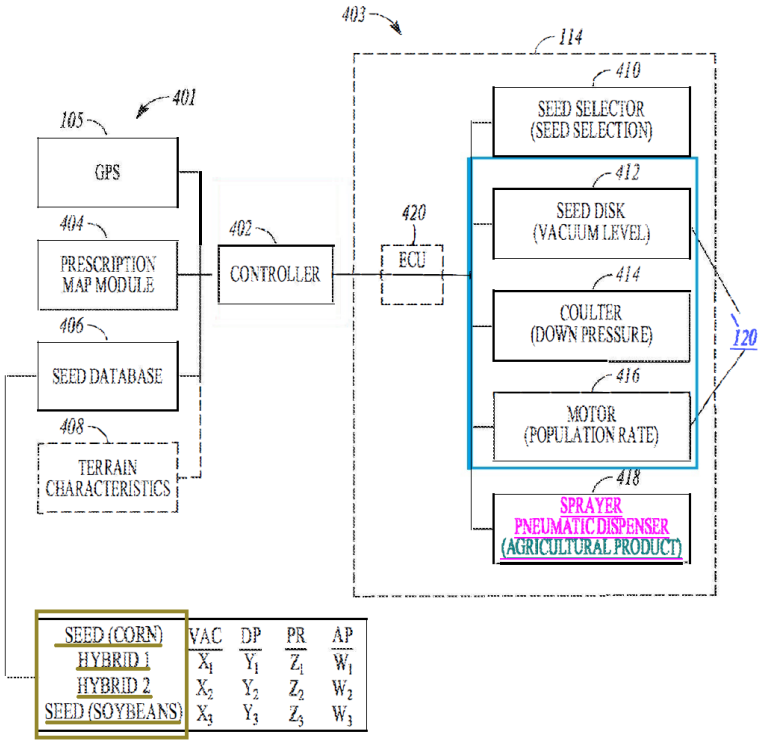
Wagers discloses a control system to effectuate a seed treatment method by selecting a seed type as well as the agricultural product and application rate of the agricultural product based on the planting location from a "prescription map". Ex. 1004, [0008], [0028], [0033], [0053], [0063], [0089], [0116]; Ex. 1003, ¶ 70. Wagers discloses that the seed types, agricultural products, and application rates can vary by "dynamically changing" these "adjustable planting characteristics" based on the planting location which is continuously updated as the planter moves through the field. Ex. 1004, [0008], [0028], [0033], [0053], [0062], [0089], [0116]; Ex. 1003, ¶ 69-70. The seed treatment method in Wagers uses a "prescription map" to calculate the planting location and divide the field into zones based on conditions of the terrain and include the desired type and amount of the respective agricultural product. Ex. 1004, [0008], [0028], [0033], [0040]; Ex. 1003, ¶ 70. The seed treatment method of Wagers also occurs "contemporaneously" with the delivery of the seeds at the planting location and includes a seed metering system to hold each seed while the sprayer or pneumatic dispenser applies the substance to

each seed. Ex. 1004, [0028], [0037], [0040], [0051]; Ex. 1003, ¶ 70. Such a metering system includes a variety of controllable variables to ensure the device can reliably hold each seed independent of the size, shape, and weight of the seed and to control the "rates or types of agricultural product dispensed" and "rate of seed dispensing for planting based on the prescription map." Ex. 1004, [0028], [0037], [0040], [0058], [0059]; Ex. 1003, ¶ 70. Accordingly, the seed treatment method of Wagers "ensures that each of a variety of seed types are handled and planted according to the characteristics of the seed" and "characteristics of the field." Ex. 1004, [0008]; Ex. 1003, ¶ 70.

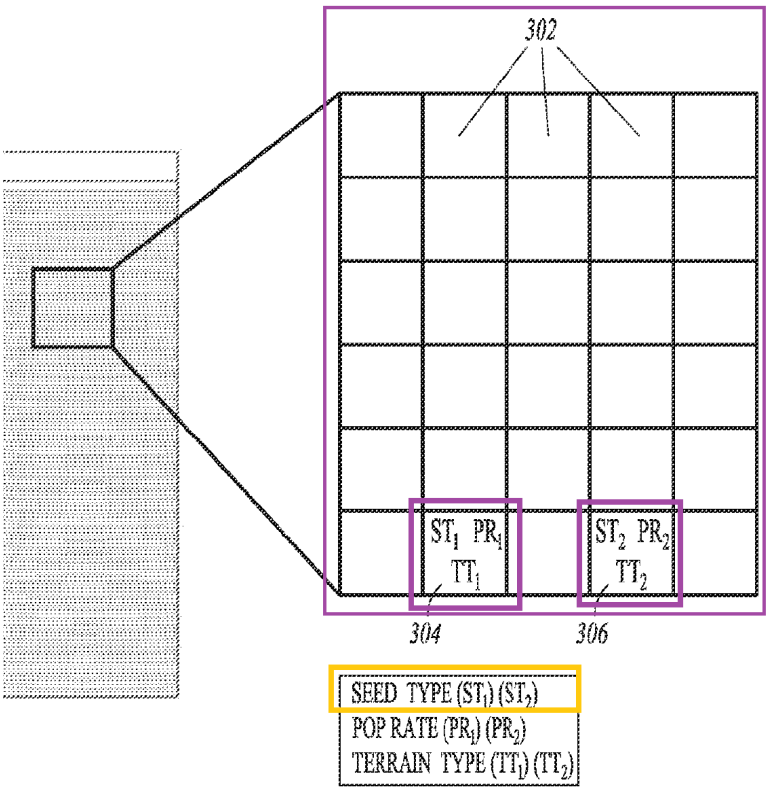
1. Wagers anticipates claim 1.

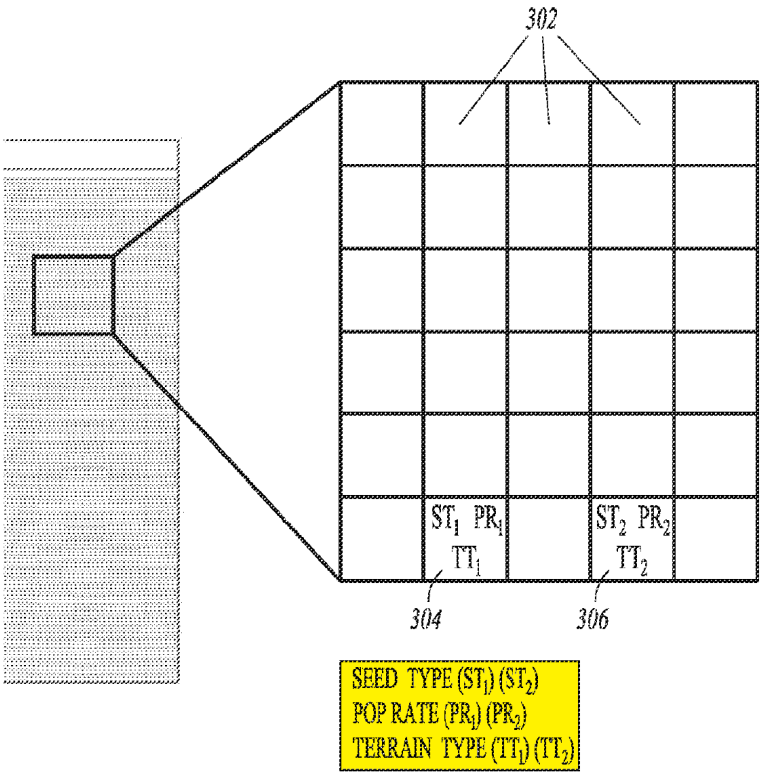
Wagers discloses all elements of independent claim 1 of the '027 Patent as shown below and confirmed by Dr. Giles in his declaration and attached claim charts. Ex. 1003, ¶¶ 83-95, Appendix C.

US 12,102,027	Wagers (Ex. 1004)
Claim 1. A prescriptive seed treatment method comprising the steps of:	**[0008]** "The method monitors a ***planter location*** on a ***prescription map*** of a field, ***selects a seed type based on the monitored planter location on the prescription map, and then dynamically changes one or more of the planter characteristics based on at least the selected seed type***. … Dynamic changing of the planter characteristics ensures that each of a variety of seed types are handled and planted according to the characteristics of the seed (and optionally other characteristics of the field or prescription map). ***Some of the planter characteristics that are dynamically changed during***

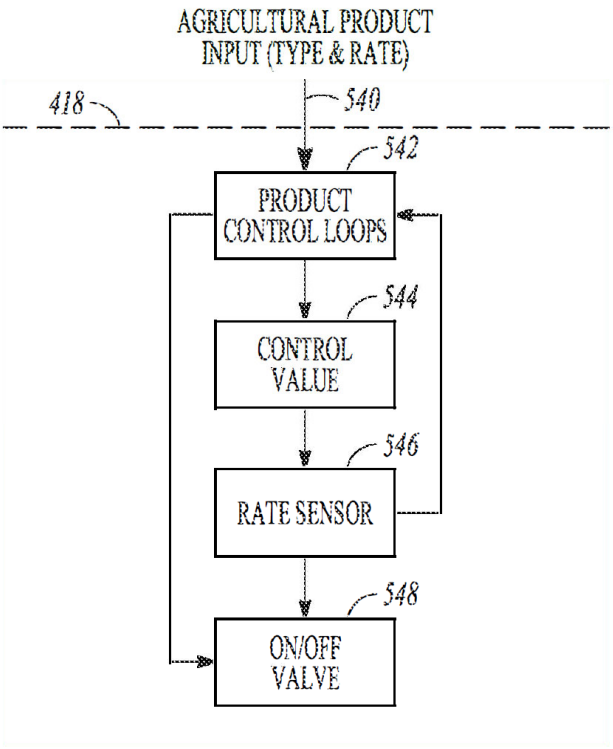
	operation of the planter include, but are not limited to, vacuum level, population rate, coulter down pressure, agricultural product selection and application rate or the like." *See also* [0053], [0063].
providing: a. a *planter*, b. a ***seed drop tube***, c. a *substance receptacle*, d. a *substance applicator*, e. a ***seed***, and f. a ***seed-applied substance***;	 *FIG. 1*  *FIG. 4*

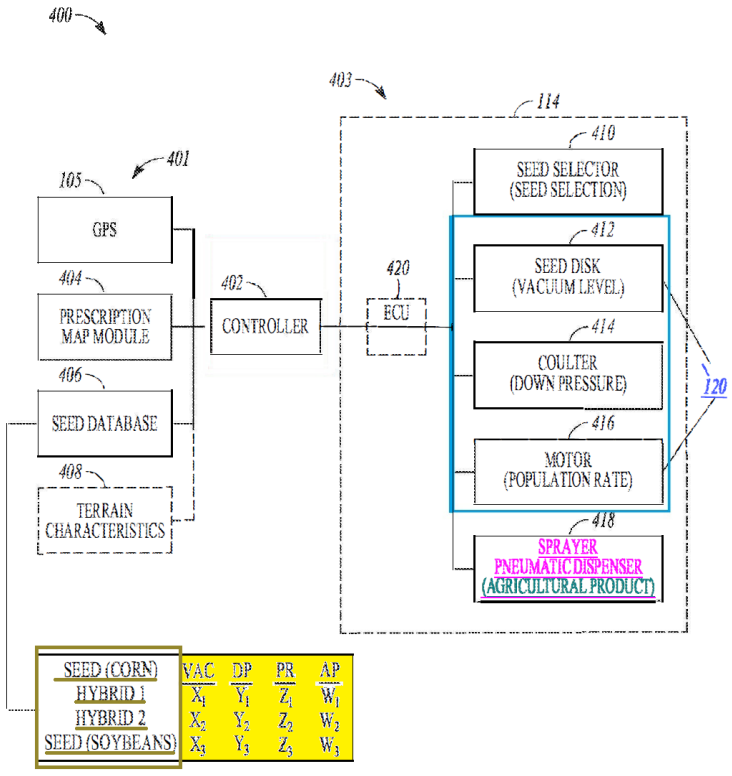
	[0026] "Referring again to FIG. 1, the ***multi-seed planter 104*** as shown includes a plurality of features configured to plant differing varieties of a ***seed*** or differing seeds. For instance the ***multi-seed planter 104*** includes a seed hopper 108." **[0028]** "In another example, the ***multi-seed planter 104*** includes one or more *agricultural product reservoirs* 116, 118. For instance, in one example a ***liquid fertilizer or herbicide*** is provided in the *agricultural product reservoir* 116. In one example the *agricultural product reservoir* 116 is distributed throughout the row units 114 for instance to corresponding ***spray units*** associated with each of the one or more row units 114 or associated with two or more row units 114." **[0029]** "Referring now to FIG. 2 another example of a ***multi-seed planter 200*** is provided. … In one example, ***each of the first and second sets of row units 202, 204 includes separate components for each of the respective row units (e.g., coulters, seed metering systems including seed wheels, seed hoppers and the like)***." **[0033]** "In one example, the seed type prescribed in each of the Zones 302 correspondingly determines one or more ***planter*** characteristics of the multi-hybrid ***planter 104*** including for instance one or more remotely adjustable planting characteristics of one or more of the row units 114 previously shown in FIG. 1." **[0040]** "In one example a seed selector 410 is operated to accordingly feed the ***selected seed*** to the ***seed metering system 120*** (e.g., including the seed disk driven by a motor such as a hydraulic motor, the vacuum fan). The seed disk 412 accordingly adjusts its vacuum level … … ***for planting according to a population rate for instance a population rate determined by a rotational speed provided by the motor 416***. … In still another example, the ***controller***

	402 controls a down-pressure of the coulter 414 according to the seed type being planted. The ***coulter*** pressure is in one example adjusted upwardly or downwardly to provide a desired depth for planting of the ***selected seed***." **[0050]** Referring now to FIG. 5E one example of ***an agricultural product dispenser 418*** Such as one or more of a ***sprayer or pneumatic system*** for respective liquid or ***granular fertilizer, herbicide, insecticide or the like*** is provided. *See also* [0036], [0088]-[0090], [0116].
calculating ***a location within a field*** where ***the seed will be delivered*** to the soil by the planter	 *FIG. 3* **[0039]** "In one example the ***location of the planter 104 for instance determined with the GPS antenna 105*** cooperates with the prescription map module 404 ***to accordingly determine a seed type to be dispensed*** by one or more of the row units 114. As further shown in FIG. 4 in one example ***the seed type***

	selected by way of cooperation between the GPS antenna 105 and the prescription map module 404 corresponds to a seed type contained within the seed database 406." *See also* [0032], [0041], [0053].
selecting, based at least in part on a condition, a combination of the seed and the seed-applied substance by selecting a type of seed-applied substance and	 *FIG. 3* **[0008]** "The method monitors a planter location on a prescription map of a field, selects a seed type based on the monitored planter location on the prescription map, and then ***dynamically changes one or more of the planter characteristics based on at least the selected seed type***." **[0028]** "a control system associated with the multi-seed planter 104 … within an agricultural field, for instance ***an agricultural field with indexed zones having prescriptions for particular seed types and planter characteristics***" **[0028]** "The agricultural product reservoirs **118** are configured to provide the agricultural product

	contemporaneously with dispensing and planting of seeds." **[0033]** "the seed type prescribed in each of the Zones 302 correspondingly determin***es*** one or more ***planter characteristics*** of the multi-hybrid planter 104 including for instance … the ***selection of one or more agricultural products and the rate of application of the one or more agricultural products***" **[0040]** "provide ***a desired type and amount of the respective agricultural product based on the seed selected and optionally one or more of the terrain characteristics*** for instance provided by the terrain characteristic module 408 ***corresponding to one or more sensors or terrain characteristics associated with the plurality of Zones*** (e.g., the Zones 302) in the prescription map 300." *See also* [0032], [0062], [0067].

calculating a desired application amount of the selected type of the seed-applied substance to be applied to and carried by the seed to the soil	 *FIG. 5E* **[0028]** **"**The agricultural product reservoirs 118 are configured to ***provide the agricultural product contemporaneously with dispensing and planting of seeds***." **[0033]** "the seed type prescribed in each of the Zones 302 correspondingly determines one or more planter characteristics of the multi-hybrid planter 104 including for instance … the ***selection of one or more agricultural products and the rate of application of the one or more agricultural products***" **[0040]** "In a similar manner one or more of the sprayer or pneumatic dispenser 418 for liquid and granular agricultural products 418 are ***adjusted to provide a desired type and amount of the respective agricultural product based on the seed selected and optionally one or more of the terrain characteristics***

	for instance provided by the terrain characteristic module" **[0050]** "In one example a rate sensor 546 is provided on the output side of the control valve 544 ***to accordingly measure the opening of the control valve 544 and the actual dispensation rate*** (e.g., as a flow meter) from the agricultural product dispenser 418. The output from the rate sensor 546 is communicated to the valve controller 542 ***to achieve a desired target rate and type of agricultural product dispensation by feedback control***." **[0051]** "in one example the control valve 544 is ***used to apply a particular rate of an agricultural product*** with the respective row unit 114"
generating the combination of the seed and the selected type of the seed-applied substance at least in part by individually applying the desired application amount of the selected type of the seed-applied substance to each seed as it is being delivered to the soil and	 *FIG. 4*

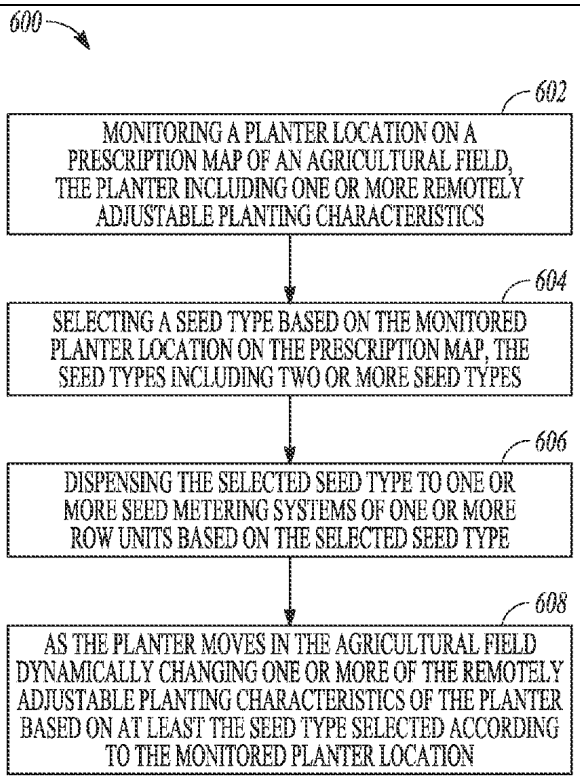
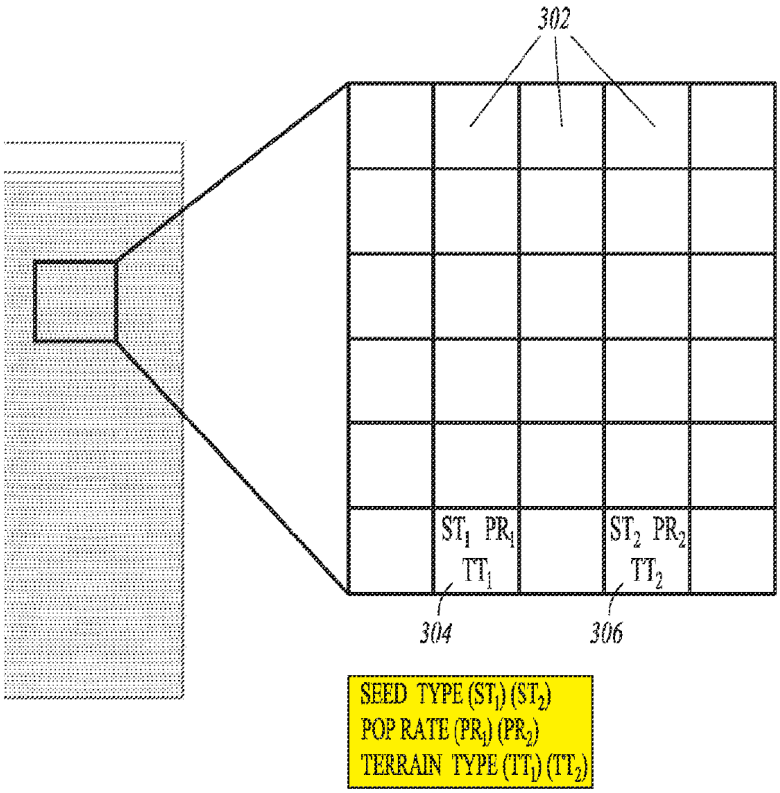


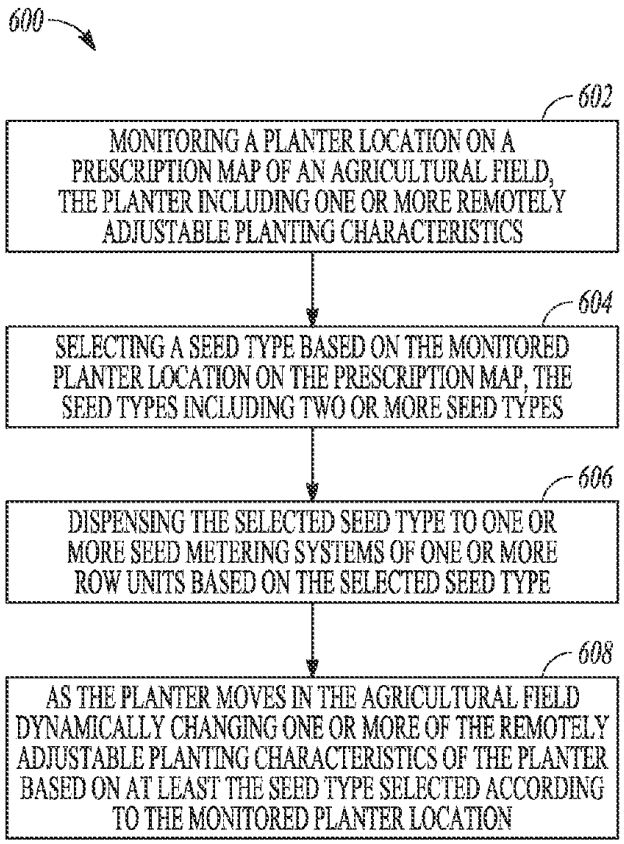
FIG. 6

[0028] "***The*** *agricultural product reservoirs* ***118 are configured to provide the agricultural product contemporaneously with dispensing and planting of seeds***."

[0040] "In one example a seed selector 410 is operated to accordingly feed the ***selected seed*** to the ***seed metering system 120 (e.g., including the seed disk driven by a motor such as a hydraulic motor, the vacuum fan)***. The seed disk 412 accordingly adjusts its vacuum level according to the seed type selected based on instructions from the controller 402. The ***vacuum level is adjusted in one example to reliably hold each of the seeds along the seed disk (e.g., based on the respective size, shape, and weight of the seed)*** for planting … In still another example, the controller 402 controls a down-pressure of the ***coulter*** 414 according to the seed type being planted. The ***coulter*** pressure is in one example adjusted upwardly or downwardly to provide a desired depth

	for planting of the selected seed. In a similar manner ***one or more of the for liquid and granular agricultural products are adjusted to provide a desired type and amount of the respective agricultural product based on the seed selected*** and optionally one or more of the terrain characteristics for instance provided by the terrain characteristic module…" **[0051]** "in one example the control valve 544 is ***used to apply a particular rate of an agricultural product*** with the respective row unit 114" **[0060]** In another example dynamically changing one or more remotely adjustable planting characteristics … In one example ***specified vacuum levels are associated with each of one or more hybrids or each of a differing seed types and the controller 402 changes the vacuum level for instance of one or more of the seed disks 412 is based on the selected seed type.*** *See also* [0061].

delivering the combination of the seed and the selected type of the seed-applied substance to the soil at the calculated location within the field for planting	 *FIG. 3* **[0028]** "The agricultural product reservoirs 118 are configured to ***provide the agricultural product contemporaneously with dispensing and planting of seeds***" **[0033]** "the ***seed type prescribed in each of the Zones 302*** correspondingly determines one or more ***planter*** characteristics of the multi-hybrid ***planter 104*** including for instance … the ***selection of one or more agricultural products and the rate of application of the one or more agricultural products***" **[0041]** Accordingly with multi-seed control system 400 provided in FIG. 4 ***one or more of the characteristics of the planter*** for instance a plurality of remotely adjustable planting characteristics are adjusted for one or more of the row units 114 ***according to the seed type selected and optionally according to one or more other characteristics, for***

	instance terrain characteristics and the like. The multi-seed control system 400 is thereby able to optimally plant a plurality of seed types for instance one or more hybrids within the same field according to information indexed to the Zones 302 of the prescription map 303. ***The prescription map 300 provides indicates the seed type to be planted in each of one or more Zones*** and accordingly the seed type (optionally in combination with one or more characteristics) is used to adjust one or more of the planting characteristics of one or more of the row units 114
wherein the type of the seed-applied substance, and the desired application amount of the selected type of the seed-applied substance can vary as the planter changes locations within the field.	 *FIG. 6* **[0062]** "dynamically changing one or more of the remotely adjustable planting characteristics further includes ***selecting an agricultural product (e.g., one or more of a liquid or granular product) for***

	application according to the monitored planter location 104 on the prescription map" *See also* [0040].

As Dr. Giles further explains, a POSA would read and understand the multi-seed planters disclosed in Wagers to "necessarily include seed drop tubes below the seed metering wheels for placing the seeds at the rate set by the metering wheel in the furrow set by the coulters." Ex. 1003, ¶ 89. Seed drop tubes are "a well understood and necessary component ubiquitous in all such multi-seed planters and have been used in planters since the advent of mechanized agriculture over a century ago." *Id.*; *see, e.g.,* Ex. 1005. "The planting precision disclosed in Wagers, as excerpted above, requires the use of seed drop tubes, which are a necessary component of the multi-seed planters disclosed therein." Ex. 1003, ¶ 89.

As excerpted above, Wagers discloses the metering of individual seeds and applying an agricultural product or substance contemporaneously with the dispensing of the seed. *See* Ex. 1004, [0028], [0029], [0036], [0040], [0060], [0088]; Ex. 1003, ¶ 92. Dr. Giles explains that "[o]ne of ordinary skill in the art would understand this to necessarily disclose application of the substance to the individual seed just prior to placement in the ground." Ex. 1003, ¶ 92, 303.

2. Wagers anticipates claim 2.

Wagers discloses all elements of dependent claim 2 of the '027 Patent as shown below and confirmed by Dr. Giles in his declaration and attached claim

charts. Ex. 1003, ¶¶ 96-99, 303, Appendix C.

US 12,102,027	Wagers (Ex. 1004)
Claim 2. The method of claim 1 wherein the step of selecting, based at least in part on the condition, the combination of seed and seed-applied substance further comprises selecting a seed type.	[0008] "The method monitors a planter location on a prescription map of a field, ***selects a seed type based on the monitored planter location on the prescription map***, and then dynamically ***changes one or more of the planter characteristics based on at least the selected seed type***." [0028] "a control system associated with the multi-seed planter 104 is configured to select one of a plurality of seed types for instance provided within the seed hopper 108 and accordingly dispense the seed from one or more of the row units 114 according to the position of the multi-seed planter 104 within an agricultural field, for instance an agricultural field with indexed zones ***having prescriptions for particular seed types and planter characteristics***" *See also* [0039].

3. Wagers anticipates claim 3.

Wagers discloses all elements of dependent claim 3 of the '027 Patent as shown below and confirmed by Dr. Giles in his declaration and attached claim charts. Ex. 1003, ¶¶ 100-03, 303, Appendix C.

US 12,102,027	Wagers (Ex. 1004)
Claim 3. The method of claim 1 wherein the combination of seed and the selected type of the seed-applied substance varies based at least in part on one of the	**[0008]** "The method monitors a ***planter location*** on a prescription map of a field, ***selects a seed type based on the monitored planter location on the prescription map***, and then ***dynamically changes one or more of the planter characteristics based on at least the selected seed type***."

following: a type of the seed, the type of the seed-applied substance, and an application rate of the seed-applied substance.	**[0037]** "In a similar example, characteristics regarding another type of seed, such as Soybeans are also provided. In one example ***the seed database 406 accordingly associates one or more planter characteristics such as*** seed disk vacuum level, ***coulter*** down-pressure, population rate (corresponding to operation of hydraulic motor configured to rotate the seed disk) and ***agricultural product dispensation with each of the types of seeds***." **[0040]** "In a similar manner one or more of the ***sprayer or pneumatic dispenser 418*** for liquid and granular agricultural products 418 are ***adjusted to provide a desired type and amount of the respective agricultural product based on the seed selected and optionally one or more of the terrain characteristics*** for instance provided by the terrain characteristic module" *See also* [0033].

4. Wagers anticipates claim 4.

Wagers discloses all elements of dependent claim 4 of the '027 Patent as shown below and confirmed by Dr. Giles in his declaration and attached claim charts. Ex. 1003, ¶¶ 104-08, 303, Appendix C.

US 12,102,027	**Wagers (Ex. 1004)**

Claim 4. The method of claim 1 wherein a ***controller*** can be used to calculate the ***location*** where the seed will be delivered to the soil, select, based at least in part on the condition, the combination of seed and seed-applied substance to plant at the ***location***, generate the combination of the seed and the selected type of the seed-applied substance, or plant the combination of seed and the selected type of the seed-applied substance.

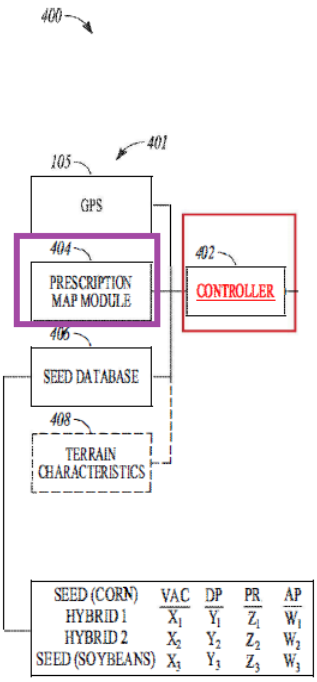


FIG. 4

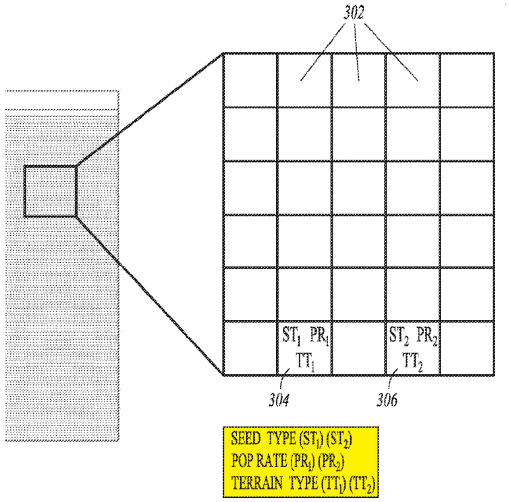


FIG. 3

[0039] "The ***controller 402 accordingly sends instructions*** to one or more of the row units 114 ***corresponding to the seed type selected for the particular Zone of the field*** including one or more row units 114."

[0040] "the ***controller 402*** based on the seed type selected and the according prescription for each of the seeds ***adjusts one or more characteristics of the***

	one or more row units 114. In one example a seed selector 410 is operated to accordingly feed the selected seed to the seed metering system 120 (e.g., including the seed disk driven by a motor such as a hydraulic motor, the vacuum fan). The ***seed disk 412 accordingly adjusts its vacuum level according to the seed type selected based on instructions from the controller 402***. The vacuum level is adjusted … In another example ***the population rate controlled by the motor 416 is also determined by the controller 402*** by way of the prescription provided in the seed database 406. In still another example, ***the controller 402 controls a down-pressure of the coulter 414*** according to the seed type being planted. The ***coulter*** pressure is in one example adjusted upwardly or downwardly to provide a desired depth for planting of the selected seed. In a similar manner ***one or more of the sprayer or pneumatic dispenser 418 for liquid and granular agricultural products 418 are adjusted to provide a desired type and amount of the respective agricultural product*** based on the seed selected and optionally one or more of the terrain characteristics for instance provided by the terrain characteristic module 408 corresponding to one or more sensors or terrain characteristics associated with the plurality of Zones (e.g., the Zones 302) in the prescription map 300." *See also* [0032], [0036], [0039].

5. Wagers anticipates claim 6.

Wagers discloses all elements of dependent claim 6 of the '027 Patent as shown below and confirmed by Dr. Giles in his declaration and attached claim charts. Ex. 1003, ¶¶ 109-13, 303, Appendix C.

US 12,102,027	Wagers (Ex. 1004)

Claim 6. The method of claim 1 wherein the ***substance applicator*** comprises a ***nozzle*** to spray the selected type of the seed-applied substance onto the seed as the seed is delivered to the soil.	**[0028]** "In one example the agricultural product reservoir 116 is distributed throughout the row units 114 for instance to corresponding ***spray units*** associated with each of the one or more row units 114 or associated with two or more row units 114." **[0028]** "The agricultural product reservoirs 118 are configured to provide the agricultural product contemporaneously with dispensing and planting of seeds." **[0036]** "In one example, the controller 402 provides instructions to each of the features of the row unit 114 for instance including the features of the seed metering system 120 as well as other features such as the coulter (corresponding to a coulter down pressure) and one or more ***agricultural product dispensers such as a sprayer or a pneumatic dispenser 418***." *See also* [0050].

As excerpted above for claim 1, Wagers discloses the metering of individual seeds and applying an agricultural product or substance contemporaneously with the dispensing of the seed. Dr. Giles has explained that "[o]ne of ordinary skill in the art would understand this to necessarily disclose application of the substance to the individual seed just prior to placement in the ground, that is, 'contemporaneously'." Ex. 1003, ¶ 112. Further, "one of ordinary skill in the art would understand that the 'spray unit' or 'sprayer or pneumatic dispenser' would functionally and necessarily include a spray nozzle." *Id.*

6. Wagers anticipates claim 7.

Wagers discloses all elements of dependent claim 7 of the '027 Patent as shown below and confirmed by Dr. Giles in his declaration and attached claim charts. Ex. 1003, ¶¶ 114-17, 303, Appendix C.

US 12,102,027	Wagers (Ex. 1004)
Claim 7. The method of claim 1 wherein the step of generating the combination of the seed and the selected type of the seed-applied substance further comprises: providing a metering device; and metering an amount of the selected type of the seed-applied substance from the substance receptacle through a substance flow path to the substance applicator with the metering device.	**[0050]** "In one example a ***rate sensor 546*** is provided on the output side of the ***control valve 544*** to accordingly ***measure the opening of the control valve 544 and the actual dispensation rate (***e.g., as a flow meter) from the agricultural product dispenser 418. The output from the rate sensor 546 is communicated ***to the valve controller 542 to achieve a desired target rate and type of agricultural product dispensation by feedback control***."

7. Wagers anticipates claim 11.

Wagers discloses all elements of dependent claim 11 of the '027 Patent as shown below and confirmed by Dr. Giles in his declaration and attached claim charts. Ex. 1003, ¶¶ 118-21, 303, Appendix C.

US 12,102,027	Wagers (Ex. 1004)

<u>Claim 11</u>. The method of claim 1 wherein the substance applicator is associated with at least one of: a. a mixer in fluid communication with the substance receptacle and a substance flow path; b. a seed hopper configured to receive the seed from a seed receptacle; c. a seed meter configured to receive the seed from the seed hopper and further transfer it through a seed flow path; and d. the seed drop tube.	**[0028]** "In one example the *agricultural product reservoir* 116 is distributed throughout the row units 114 for instance to corresponding ***spray units associated with each of the one or more row units 114*** or associated with two or more row units 114." **[0028]** "The *agricultural product reservoirs* ***118*** are configured to provide the agricultural product ***contemporaneously with dispensing*** and planting of seeds" **[0029]** "As further shown in FIG. 2 … , ***each of the first and second sets of row units 202, 204 includes separate components for each of the respective row units (e.g., <u>coulters</u>, <u>seed</u> <u>metering</u> <u>systems</u> including seed wheels, seed hoppers and the like)***." *See also* [0036].

8. Wagers anticipates claim 13.

Wagers discloses all elements of dependent claim 13 of the '027 Patent as shown below and confirmed by Dr. Giles in his declaration and attached claim charts. Ex. 1003, ¶¶ 122-27, 303, Appendix C.

US 12,102,027	Wagers (Ex. 1004)
<u>Claim 13</u>. The method of claim 1 wherein the desired application amount of the selected type of the seed-applied	**[0051]** "As further shown in FIG. 5E, in one example a shutoff valve 548 is associated with the agricultural product dispenser 418. In one example the valve controller 542 further operates the shutoff valve 548 to accordingly shut off the flow of one or more of liquid or granular agricultural product to the respective row unit 114. Accordingly in one

substance to be applied to the seed is either: always the same amount of seed-applied substance; or only either one specific amount of seed-applied substance or no amount of the seed-applied substance.	example ***the control valve 544 is used to apply a particular rate of an agricultural product with the respective row unit 114 while the shutoff valve 548 is used to toggle between application or an interruption of application of the agricultural product at the rate provided by the control valve 544.***

As Dr. Giles explains, "a POSA would understand the ordinary meaning of dependent claim 13 to require a method where the application amount of the seed-applied substance either: (1) is constant across all planter locations within the field; or (2) alternates between no application and the application of an unvarying amount across all planter locations with the field. This contrasts with claim 1, from which claim 13 depends, which requires that the application amount can vary as the planter changes locations within the field." Ex. 1003, ¶ 124.

Also according to Dr. Giles, "[o]ne of ordinary skill in the art would understand it was and is a common agricultural practice to apply an agricultural product at a fixed rate throughout a given field if the relevant conditions within the field are uniform or, alternatively, to alternate between no application and a fixed application if, as an example, one variety of seed is planted on part of a field and another variety is planted in another part of the field." Ex. 1003, ¶ 126. Thus, to the extent Wagers does not anticipate claim 13, it would have been obvious to use the shutoff valve of Wagers to apply an agricultural product in such a manner. *Id.*

9. Wagers anticipates claim 14.

Wagers discloses all elements of dependent claim 14 of the '027 Patent as shown below and confirmed by Dr. Giles in his declaration and attached claim charts. Ex. 1003, ¶¶ 128-31, 303, Appendix C.

US 12,102,027	Wagers (Ex. 1004)
Claim 14. The method of claim 1, wherein the type of the seed-applied substance and the desired application amount of the selected type of the seed-applied substance can vary as the planter changes location within the field by changing the type, number or amount of one or more of the seed-applied substances applied to the seed when generating the combination of the seed and the seed-applied substance.	**[0040]** "In a similar manner one or more of the sprayer or pneumatic dispenser 418 for liquid and granular agricultural products *418* ***are adjusted to provide a desired type and amount of the respective agricultural product based on*** the seed selected and optionally ***one or more of the terrain characteristics*** [408] for instance provided by the terrain characteristic module" **[0062]** "dynamically changing one or more of the remotely adjustable planting characteristics further includes ***selecting an agricultural product (e.g., one or more of a liquid or granular product) for application according to the monitored planter location 104 on the prescription map***"

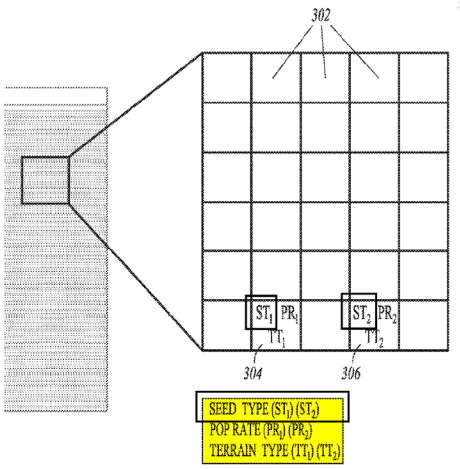
10. Wagers anticipates claim 15.

Wagers discloses all elements of dependent claim 15 of the '027 Patent as shown below and confirmed by Dr. Giles in his declaration and attached claim charts. Ex. 1003, ¶¶ 132-35, 303, Appendix C.

US 12,102,027	Wagers (Ex. 1004)
Claim 15. The method of claim 1, wherein the combination of seed and the selected type of the seed-applied substance can vary based at least in part upon a seed-applied substance type, a number of seed-applied substances, or the desired application amount of one or more of the selected type of seed-applied substance.	**[0040]** "In a similar manner one or more of the sprayer or pneumatic dispenser 418 for liquid and granular agricultural products 418 ***are adjusted to provide a desired type and amount of the respective agricultural product based on*** the seed selected and optionally ***one or more of the terrain characteristics*** [408] for instance provided by the terrain characteristic module" **[0062]** "dynamically changing one or more of the remotely adjustable planting characteristics further includes ***selecting an agricultural product (e.g., one or more of a liquid or granular product) for application according to the monitored planter location 104 on the prescription map***"

11. Wagers anticipates claim 16.

Wagers discloses all elements of dependent claim 16 of the '027 Patent as shown below and confirmed by Dr. Giles in his declaration and attached claim charts. Ex. 1003, ¶¶ 136-39, 303, Appendix C.

US 12,102,027	Wagers (Ex. 1004)
Claim 16. The method of claim 1, wherein the combination of seed and the selected type of the seed-applied substance can vary based at least in part upon a seed type.	 *FIG. 3*

	[0008] "The method monitors a planter location on a prescription map of a field, ***selects a seed type based on the monitored planter location on the prescription map, and then dynamically changes one or more of the planter characteristics based on at least the selected seed type***. … Dynamic changing of the planter characteristics ensures that each of a variety of seed types are handled and planted according to the characteristics of the seed (and optionally other characteristics of the field or prescription map). ***Some of the planter characteristics that are dynamically changed during operation of the planter include***, but are not limited to, vacuum level, population rate, ***coulter*** down pressure, ***agricultural product selection and application rate*** or the like." **[0040]** "In a similar manner one or more of the sprayer or pneumatic dispenser 418 for liquid and granular agricultural products 418 ***are adjusted to provide a desired type and amount of the respective agricultural product based on the seed selected*** and optionally one or more of the terrain characteristics for instance provided by the terrain characteristic module" *See also* [0037].

B. Ground 2: Claims 1-7 and 11-16 of the '027 Patent are Obvious over Wagers in view of Mitchell

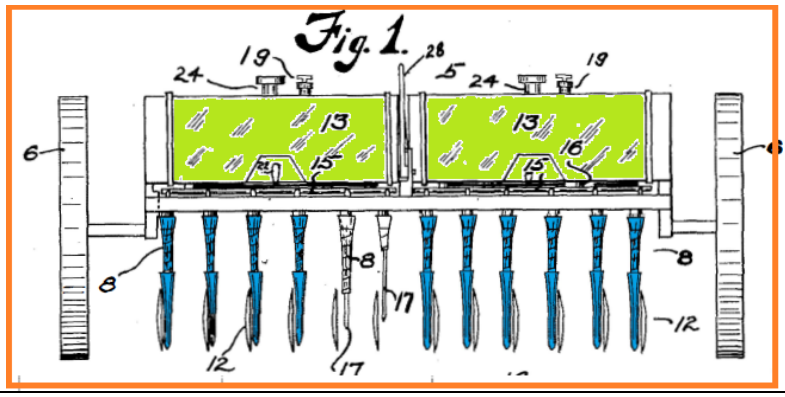
Mitchell is a U.S. patent titled "Antismut Grain and Soil Treating Process and Apparatus" and issued March 14, 1922 as U.S. Patent No. 1,409,564. Mitchell was filed on April 8, 1919. Ex. 1005, cover. Mitchell constitutes prior art under 35 U.S.C. § 102(a)(1).

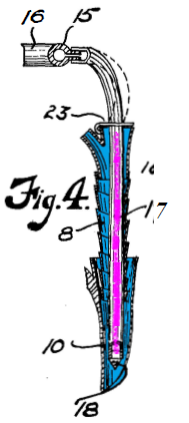
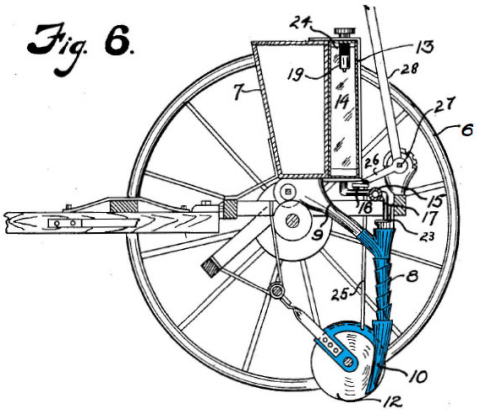
Mitchell discloses a seed treatment method utilizing "an ordinary" planter. Ex. 1005, page 2:8-18; Ex. 1003, ¶ 72. The Mitchell planter included a seed hopper 7, a seed drop tube 8, teeth points to open furrows in the soil 10, and closing wheels 12 as well as a substance receptacle 13, a substance applicator 17, and a seed-applied substance "formalin" to apply to the seed. Ex. 1005, page 2:8-54; Ex. 1003, ¶ 72. Mitchell further disclosed a seed-applied substance and applying the desired application amount of the selected type of the seed-applied substance to each seed as it is being delivered to the soil: "as the seed is about to enter the earth at the lower extremities 10 of the hollow teeth, the liquid is applied to the grain" and "spraying the seed as it falls." Ex. 1005, page 2:54-64, 101-105; Ex. 1003, ¶ 72.

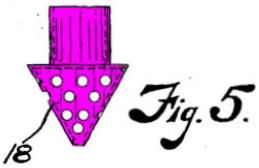
According to Mitchell, the seed "is conducted to the earth by" the seed drop tubes 8 and the seed treatment method includes "spraying the seed as it drops to the ground." Ex. 1005, page 2:106-109, 116-124; Ex. 1003, ¶ 73. Accordingly, Mitchell disclosed planters including seed drop tubes that provide for the release of seed at or near the ground, and allow precision in seed placement and may be used in conjunction with a spraying system in order to provide treated seeds as the seed drops into the ground. Ex. 1003, ¶ 73.

1. Claim 1 is obvious over Wagers in view of Mitchell

Claim 1 of the '027 Patent is not only anticipated by Wagers, as addressed above in Section VIII.A.1, but claim 1 is also obvious over Wagers in view of Mitchell. Ex. 1003, ¶¶ 140-47. To the extent it is determined that Wagers alone does not disclose "seed tubes" or "applying … the seed-applied substance to each seed as it is being delivered to the soil," Mitchell discloses those elements as shown below and confirmed by Dr. Giles in his declaration and attached claim charts. Ex. 1003, ¶¶ 140-47, 303, Appendix C.

US 12,102,027	Wagers (Ex. 1004) + Mitchell (Ex. 1005)
Claim 1. A prescriptive seed treatment method comprising the steps of:	**Wagers (Ex. 1004)**: *See* Section VIII.A.1 above.
providing: g. a *planter*, h. a ***seed drop tube***, i. a *substance receptacle*, j. a *substance applicator*, k. a ***seed***, and l. a ***seed-applied substance***;	**Wagers (Ex. 1004)**: *See* Section VIII.A.1 above. **Mitchell (Ex. 1005)**: 

	 Fig. 4.  Fig. 6. **(Page 2:8-19)** "Let the numeral 5 designate an ordinary ***grain drill*** or ***seeder***, considered in its entirety, the same being mounted on ground wheels, 6, and provided with a grain box, 7, and ***hollow teeth, 8, which are connected as shown at 9 with the box whereby the seed grain passes from the box into the hollow teeth and thence into the earth***, the points 10 of the teeth coming in contact with the soil, discs 12 being employed for covering the ***grain*** as it is deposited. This is a ***grain drill*** or ***seeder*** of ordinary construction." *See also* Page 2:36-47, 36-47, 54-64, 101-105, 121-124; Page 3:3-6, 11-12; Fig. 5.
calculating ***a location within a field*** where ***the seed will be delivered*** to the soil by the planter	**Wagers (Ex. 1004)**: *See* Section VII.A.1 above.

selecting, based at least in part on a condition, a combination of the seed and the seed-applied substance by selecting a type of seed-applied substance and	**Wagers (Ex. 1004)**: *See* Section VII.A.1 above.
calculating a desired application amount of the selected type of the seed-applied substance to be applied to and carried by the seed to the soil	**Wagers (Ex. 1004)**: *See* Section VII.A.1 above.
generating the combination of the seed and the selected type of the seed-applied substance at least in part by individually applying the desired application amount of the selected type of the seed-applied substance to each seed as it is being delivered to the soil and	**Wagers (Ex. 1004)**: *See* Section VII.A.1 above. **Mitchell (Ex. 1005)**: Fig. 4.  Fig. 5. **(Page 2:36-47)** "Leading downwardly from the conduit, 15, is a number of spouts, 17, which pass through the hollow teeth, 8; of the seeder and are relatively small, whereby they do not interfere with the passage of the grain through the said teeth. The

	lower extremity of each of these spouts is equipped with a spray nozzle, 18, which is located just above the point 10 of the tooth, so that the liquid as it issues from the nozzle is deposited upon the grain and the soil or earth in which it is planted, simultaneously." **(Page 2:54-64)** "Then, as the machine is driven across the field, the grain passes through the ***hollow teeth*** of the drill simultaneously with the passage of the liquid through the ***spouts*** 17 of my attachment, and consequently, ***as the seed is about to enter the-earth at the lower extremities 10 of the hollow teeth, the liquid is applied to the grain*** and also to the earth, thus giving the seed and earth at the same time a treatment with the anti-smut liquid compound." **(Page 2:101-105)** "The herein described seeding process, consisting in dropping seed and simultaneously ***spraying the seed as it falls*** and the soil into which it falls with an anti-smut liquid." **(Page 3:3-6)** "The method of treating seed while being planted, consisting in ***spraying with a liquid fungicide, the seed while in transit from a source of supply to the ground***." **(Page 3:11-12)** "means for ***spraying the seed while in motion*** with a liquid fungicide" *See also* Page 2:8-19, 121-124; Figs. 1, 6.
delivering the combination of the seed and the selected type of the seed-applied substance to the soil at the calculated location within the field for planting	**Wagers (Ex. 1004)**: *See* Section VII.A.1 above.

wherein the type of the seed-applied substance, and the desired application amount of the selected type of the seed-applied substance can vary as the planter changes locations within the field.	**Wagers (Ex. 1004)**: *See* Section VII.A.1 above.

As Dr. Giles explains, "[a] POSA at the time would understand that seed drop tubes, which provide for the release of seed at or near the ground, thereby allow much greater precision in seed placement, which is one of the goals of Wagers." Ex. 1003, ¶144. Seed drop tubes are "ubiquitous features of in-row planters, including multi-row planters, seed drills, air seeders, and the like, and have been for well over a century if not longer as reflected in Mitchell, which issued as a patent in 1922." *Id.* Further, "[i]ncorporating a seed drop tube like that of Mitchell in the multi-row planter disclosed in Wagers would have been straightforward." *Id.* According to Dr. Giles, "given the widespread use of seed drop tubes, to the extent the planter disclosed in Wagers does not expressly or inherently include a seed drop tube, it would have been a standard bolt-on part widely available at the time." *Id.*

In addition and as excerpted above, Wagers discloses the metering and planting of individual seeds and the application of an agricultural substance contemporaneous with the dispensing of the seed. Ex. 1003, ¶ 145. Dr. Giles

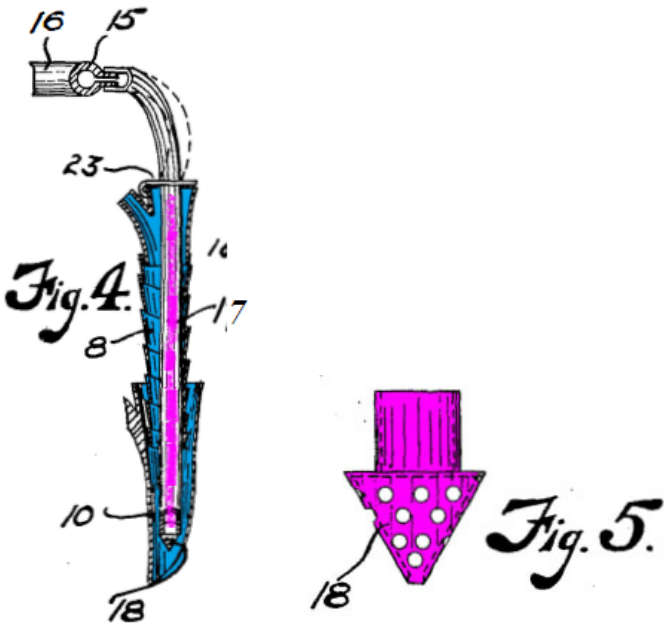
explains that "[i]t was well understood at the time that there were numerous well-known means for applying substance to individual seeds during planting, all of which are readily incorporated in the multi-row planter disclosed in Wagers, and all of which are consistent with and would further the express objective of Wagers to improve planting precision." *Id.* One such example, according to Dr. Giles, is the "hollow teeth and spray nozzle configuration of Mitchell, which provides for the spray of seed while in transit to the ground." *Id.* "One would have been motivated to incorporate the spray nozzle configuration of Mitchell because of the precision it affords," and "[i]ncorporating such a configuration in the multi-row planter disclosed in Wagers would have been straightforward." *Id.* Finally, as excerpted above for claims 6 and 11, Wagers discloses spray nozzles that are associated with the individual row units, which include "coulters, seed metering systems including seed wheels, seed hoppers and the like." Ex. 1004, [0028]-[0029]; Ex. 1003, ¶ 145.

2. Claims 2-4, 7, and 13-16 are obvious over Wagers in view of Mitchell

Because claims 2-4, 7, and 13-16 all depend from claim 1 and because all of the elements of those dependent claims are disclosed in Wagers (as addressed above in Section VIII.A), each of these claims is obvious over Wagers in view of Mitchell for the reasons addressed above in Section VIII.A. Ex. 1003, ¶¶148-50, 303.

3. Claims 5 and 12 are obvious over Wagers in view of Mitchell

Mitchell discloses all elements of dependent claims 5 and 12 of the '027 Patent as shown below and confirmed by Dr. Giles in his declaration and attached claim charts. Ex. 1003, ¶¶ 151-56, 303, Appendix C.

US 12,102,027	Wagers (Ex. 1004) + Mitchell (Ex. 1005)
Claim 5. The method of claim 1 wherein the selected type of the seed-applied substance is applied to the seed proximate to the ***seed drop tube.***	**Mitchell (Ex. 1005):**  **(Page 2:36-47)** "Leading downwardly from the conduit, 15, is a number of ***spouts***, 17, which pass through the ***hollow teeth***, 8; of the seeder and are relatively small, whereby they do not interfere with the passage of the grain through the said teeth. The ***lower extremity of each of these spouts is equipped with a spray nozzle, 18, which is located just above the point 10 of the tooth***, so that the liquid as it issues from the nozzle is deposited upon the grain and the soil or earth in which it is planted, simultaneously."

Claim 12. The method of claim 1 further comprising the steps of: transferring the seed into the seed drop tube; and applying the selected type of the seed-applied substance to the seed proximate to or within the seed drop tube.	**Mitchell (Ex. 1005):** *See* Mitchell disclosure excerpted above for claim 5.

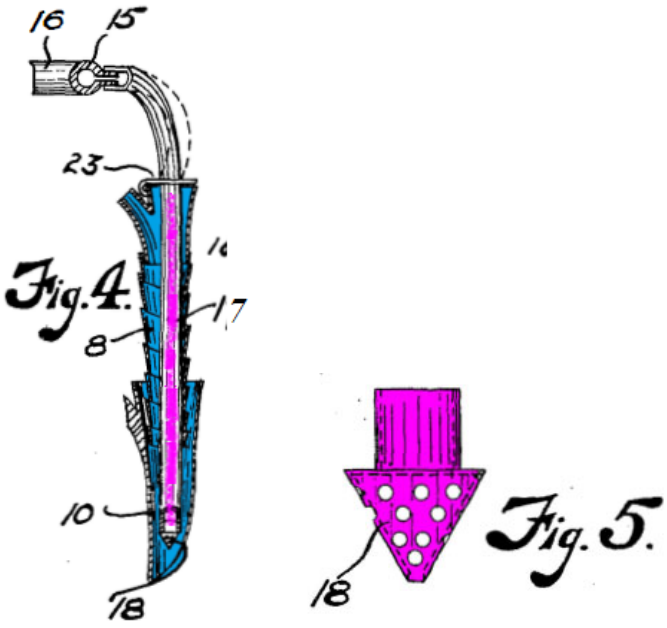
As Dr. Giles explains, "[g]iven the angled shape of the end of the hollow teeth 8 (seed drop tube) where only the tip of the angled end is in contact with the ground, as depicted in Fig. 4 above, one of ordinary skill in the art would understand that the anti-smut substance of Mitchell is necessarily applied to the seed both within hollow teeth 8 and just beyond (proximate to) the hollow teeth 8." Ex. 1003, ¶ 154.

A POSA would have been motivated to combine Wagers and Mitchell for the reasons provided above in Section VIII.B.1; Ex. 1003, ¶¶ 155-56.

4. Claim 6 is obvious over Wagers in view of Mitchell

Claim 6 of the '027 Patent is not only anticipated by Wagers, as addressed above in Section VIII.A, but claim 6 is also obvious over Wagers in view of Mitchell. Ex. 1003, ¶¶ 157-63, 303. To the extent it is determined that Wagers alone does not disclose "spray[ing] … the seed-applied substance onto the seed as the seed is delivered to the soil," Mitchell discloses those elements as shown below

and confirmed by Dr. Giles in his declaration and attached claim charts. Ex. 1003, ¶¶ 157-63, Appendix C.

US 12,102,027	Wagers (Ex. 1004) + Mitchell (Ex. 1005)
Claim 6. The method of claim 1 wherein the ***substance applicator*** comprises a ***nozzle*** to spray the selected type of the seed-applied substance onto the seed as the seed is delivered to the soil.	**Wagers (Ex. 1004):** *See* Section VIII.A.5 above. **Mitchell (Ex. 1005):**  **(Page 2:36-47)** "Leading downwardly from the conduit, 15, is a number of ***spouts***, 17, which pass through the ***hollow teeth***, 8; of the seeder and are relatively small, whereby they do not interfere with the passage of the grain through the said teeth. The ***lower extremity of each of these spouts is equipped with a spray nozzle, 18, which is located just above the point 10 of the tooth***, so that the liquid as it issues from the nozzle is deposited upon the grain and the soil or earth in which it is planted, simultaneously." **(Page 2:54-64)** "Then, as the machine is driven across the field, the grain passes through the ***hollow teeth*** of the drill simultaneously with the passage of

	the liquid through the ***spouts*** 17 of my attachment, and consequently, ***as the seed is about to enter the-earth at the lower extremities 10 of the hollow teeth, the liquid is applied to the grain*** and also to the earth, thus giving the seed and earth at the same time a treatment with the anti-smut liquid compound." **(Page 2:101-105)** "The herein described seeding process, consisting in dropping seed and simultaneously ***spraying the seed as it falls*** and the soil into which it falls with an anti-smut liquid." **(Page 3:3-6)** "The method of treating seed while being planted, consisting in ***spraying with a liquid fungicide, the seed while in transit from a source of supply to the ground***." **(Page 3:11-12)** "means for ***spraying the seed while in motion*** with a liquid fungicide" *See also* Page 2:121-124.

A POSA would have been motivated to combine Wagers and Mitchell for the reasons provided above in Section VIII.B.1. Ex. 1003, ¶¶ 161-63.

5. Claim 11 is obvious over Wagers in view of Mitchell

Claim 11 of the '027 Patent is not only anticipated by Wagers, as addressed above in Section VIII.A.7, but claim 11 is also obvious over Wagers in view of Mitchell. Ex. 1003, ¶¶ 164-70. To the extent it is determined that Wagers alone does not disclose a substance applicator that is "associated with at least one of" the recited components, Mitchell discloses those elements as shown below and confirmed by Dr. Giles in his declaration and attached claim charts. Ex. 1003, ¶¶ 164-70, 303, Appendix C.

US 12,102,027	Wagers (Ex. 1004) + Mitchell (Ex. 1005)
Claim 11. The method of claim 1 wherein the substance applicator is associated with at least one of: a. a mixer in fluid communication with the substance receptacle and a substance flow path; b. a seed hopper configured to receive the seed from a seed receptacle; c. a seed meter configured to receive the seed from the seed hopper and further transfer it through a seed flow path; and d. the seed drop tube.	**Wagers (Ex. 1004):** *See* Section VIII.A.7 above. **Mitchell (Ex. 1005):** **(Page 2:36-47)** "Leading downwardly from the conduit, 15, is a number of spouts, 17, which pass through the hollow teeth, 8; of the seeder and are relatively small, whereby they do not interfere with the passage of the grain through the said teeth. The ***lower extremity of each of these spouts is equipped with a spray nozzle, 18, which is located just above the point 10 of the tooth, so that the liquid as it issues from the nozzle is deposited upon the grain*** and the soil or earth in which it is planted, simultaneously."

A POSA would have been motivated to combine Wagers and Mitchell for the reasons provided above in Section VIII.B.1. Ex. 1003, ¶¶ 164-70.

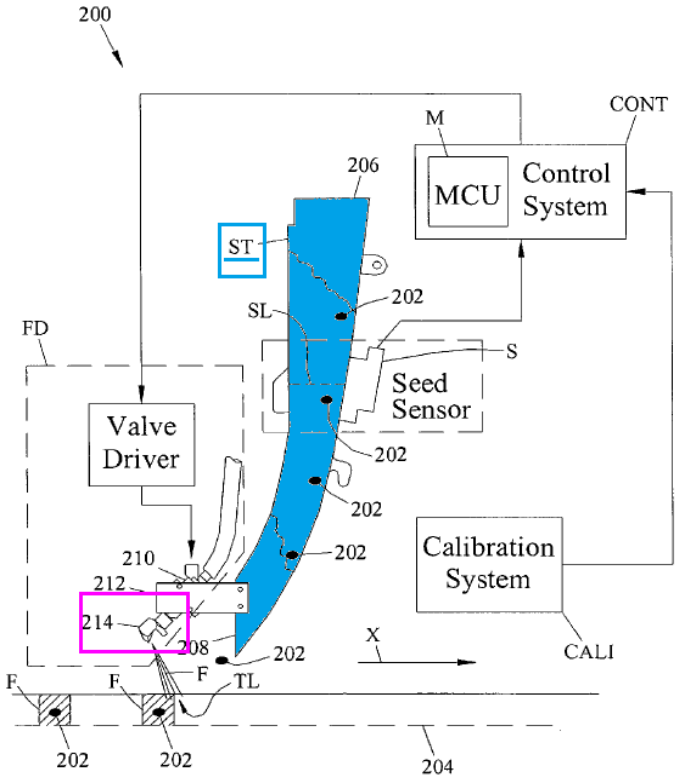
C. Ground 3: Claim 8 of the '027 Patent is Obvious over Wagers in view of Wilkerson

Wilkerson is a patent application titled "Systems and Methods for Fluid Dispensing" and published in November 25, 2004 as US2004/0231575. Wilkerson was filed on April 23, 2004. Ex. 1006, cover. Wilkerson constitutes prior art under 35 U.S.C. § 102(a)(1).

Wilkerson discloses a "conventional planter" which includes a seed hopper, a seed meter, a seed drop tube, an opening disc, seed firmer wheels, and closing wheels as well as a nozzle for applying a seed-applied substance. Ex. 1006, Fig. 1, [0005], [0027]; Ex. 1003, ¶ 75. Wilkerson also discloses a seed treatment method for a planter to "time the release of fluid F from fluid dispenser FD such that fluid F is released on ***and/or*** near each seed 202 in furrow 204" and to calculate the time "for seed 202 to move from sensed location SL" in the seed drop tube "to target location TL". Ex. 1006, [0030], [0031]; Ex. 1003, ¶ 75. According to Wilkerson, the seed treatment method "can ensure that system performance is not solely dependent on the ability of the meter and seed tube ST to deliver seeds 202 at uniform intervals to a location for receiving fluid F from fluid dispenser FD … [and] ensures that the dispensing of fluid F corresponds with the actual dropping of each seed 202, rather than the expected dropping of each seed 202." Ex. 1006, [0030], [0033]; Ex. 1003, ¶ 75.

Wilkerson discloses all elements of dependent claim 8 of the '027 Patent as shown below and confirmed by Dr. Giles in his declaration and attached claim charts. Ex. 1003, ¶¶ 171-77, 303, Appendix C.

US 12,102,027	**Wagers (Ex. 1004) + Wilkerson (Ex. 1006)**
Claim 8. The method of claim **1**, wherein the step of generating the combination of the seed	**Wagers (Ex. 1004):** *See* Section VIII.A above.

and the selected type of the seed-applied substance further comprises: providing a timing mechanism; and calculating, with the timing mechanism, both ***delivery time of the selected type of the seed-applied substance from the substance receptacle through a substance flow path to the substance applicator*** and ***travel time of the seed through a seed flow path***.	**Wilkerson (Ex. 1006):**  **[0030]** "***System 200 can time the release of fluid F from fluid dispenser FD such that fluid F is released on and/or near each seed 202 in furrow 204*** … System 200 can comprise a seed sensor S, a fluid dispenser (generally designated FD), and a control system (or control unit) CONT for dispensing fluid F on and/or near each seed 202. ***Seed sensor S can be positioned between the seed meter (not shown) and furrow 204 for detecting each time one or more seeds 202 pass a sensed location SL in seed tube ST***. Seed sensor S can also be in communication with control system CONT for indicating to control system CONT that one or more seeds 202 are detected." **[0031]** "Control system CONT can receive an indication from seed sensor S each time one or more seeds 202 pass sensed location SL. In addition, control system CONT can communicate with fluid

	dispenser FD for providing control signals to dispense fluid F on and/or near each seed 202 placed in furrow 204. ***Control system CONT can control fluid dispenser FD to dispense fluid F a predetermined time after receiving indication from seed sensor S that one or more seeds 202 have passed sensed location SL. The predetermined time can be set such that fluid dispenser FD deposits fluid F on and/or near each seed S as it reaches a target location, generally designated TL.*** **[0032]** ***The predetermined time can be selected as the time calculated for seed 202 to move from sensed location SL to target location TL where fluid dispenser FD dispenses fluid F. Thus, when control system CONT receives an indication that seed 202 passes sensed location SL, control system CONT can control fluid dispenser FD to dispense fluid F at target location TL after the predetermined time.*** During operation, seed 202 can arrive at target location TL at the predetermined time after passing sensed location SL and receive fluid F. The result is that fluid F is deposited directly on one or more seeds 202 positioned in furrow 204.*"* **[0035]** Control system CONT can comprise a programmable microcontroller unit (MCU) ... ***MCU M can implement a process for calculating the predetermined time for seed arrival at target location TL.*** The predetermined time (or seed arrival time) can be determined based on an average time for seed 202 to move from sensed location SL and the target location TL. **[0036]** ***MCU M can track one or more seeds in transit at any time between sensed location SL and target location TL. MCU M can include one or more timers each associated with one or more seeds 202 operable to track time for seeds 202 in***

	transit between sensed location SL and target location TL. **[0061]** ***The fluid systems and methods described herein can also be applied to multi-row planters.*** **[0065]** According to another embodiment, calibration can include a function relating seed arrival time to field speed, desired spray band length, valve installation geometry, and other variables influenced by seed type and the seed tube. ***The seed arrival time can be subdivided into two periods: (1) a time period within seed tube ST which comprises the seed travel time between the sensed location in seed tube ST (FIG. 2) and output end 208 (FIG. 2) of seed tube ST; and (2) a time period outside of seed tube ST which comprises the seed travel time between output end 208 of seed tube ST and the location of fluid application by fluid dispenser FD (FIG. 2).*** *See also* [0029], [0033], [0037]-[0039], [0062], [0066].

As Dr Giles explains, "[p]lanters utilizing timing mechanisms to measure both delivery time of the seed applied substance and travel time of the seed, like those disclosed in Wilkerson, were well known and have been used in agricultural planters since well before the 2015 priority date of the 027 patent." Ex. 1003, ¶ 175. "As reflected in the similarity between the multi-row planters disclosed in Wagers and Wilkerson, one of ordinary skill in the art would have recognized that the multi-row planter of Wagers could have been readily equipped with any number of seed drop tubes incorporating a timing mechanism to calculate both the timing of the application of the seed applied substance and the timing of the seed to

travel to the application location." *Id.* According to Dr. Giles, "[t]he timing mechanism would have furthered the goal in Wagers of maximizing precision in the application of the seed applied substance during planting. *Id.*, ¶ 166. This goal is also shared by Wilkerson in [0033]: "[seed detection] can ensure that system performance is not solely dependent on the ability of the meter and seed tube ST to deliver seeds 202 at uniform intervals to a location for receiving fluid F from fluid dispenser FD … [and] ensures that the dispensing of fluid F corresponds with the actual dropping of each seed 202, rather than the expected dropping of each seed 202." *Id.*

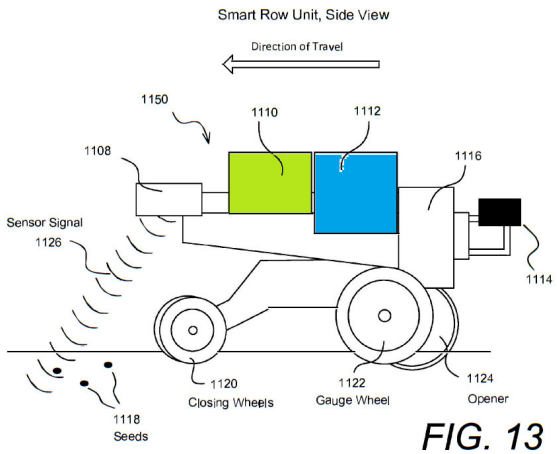
D. Ground 4: Claims 9 and 10 of the '027 Patent are Obvious over Wagers in view of Batcheller

Batcheller is a patent application titled "Method and System for Optimizing Planting Operations" and published in December 25, 2014 as US 2014/0379228. Batcheller was filed on June 21, 2014. Ex. 1007, cover. Batcheller constitutes prior art under 35 U.S.C. §§ 102(a)(1), (a)(2).

Batcheller discloses a seed treatment method using a multi-row unit planter with row units 1104 including a seed hopper 1112, a seed meter 1112, an opening disc 1124, seed firmer wheels 1122, and closing wheels 1120 with a "nutrient system 1110". Ex. 1007, [0131], [0133], [0134]; Ex. 1003, ¶ 77. This "nutrient system 1110" in figure 13 "contains several types of chemicals, which may include fertilizers and pesticides, individual soil nutrients, and water, all of which can be

added to the furrow or to the seed itself as required based on the soil conditions," which according to Batcheller "may be separated by type and mixed together in the nutrient system 1100 as required to create the proper supplement to add to the soil." Ex. 1007, [0143]; Ex. 1003, ¶ 77.

Batcheller discloses all elements of dependent claims 9 and 10 of the '027 Patent as shown below and confirmed by Dr. Giles in his declaration and attached claim charts. Ex. 1003, ¶¶ 178-83, 303. Appendix C.

US 12,102,027	Wagers (Ex. 1004) + Batcheller (Ex. 1007)
Claim 9. The method of claim 1 further comprising the steps of: providing *a mixer* in fluid communication with the substance receptacle and a substance flow path; and mixing the seed-applied substance prior to the selected type of the seed-applied substance being applied to the seed.	**Wagers (Ex. 1004):** *See* Section VIII.A above. **Batcheller (Ex. 1007):**  FIG. 13 **[0143]** "The *nutrient system 1110 contains several separate types of chemicals*, which may include fertilizers and pesticides, individual soil nutrients, and water, all of which can be added to the furrow or to the seed itself as required based on the soil conditions. ***The nutrient may be separated by type and mixed together in the nutrient system 1110 as***

	required to create the proper supplement to add to the soil." *See also* [0134], [0135].
Claim 10. The method of claim **1** further comprising the step of: adjusting a mixture ratio of the seed-applied substance during operation of the planter.	**Wagers (Ex. 1004):** *See* Section VIII.A above. **Batcheller (Ex. 1007):** *See* Claim 9 above**.**

Wagers disclosed "agricultural product reservoirs 116, 118" (shown in fig. 1) that contain "liquid fertilizer or herbicide" and associated "spray units" that "are adjusted to provide a desired type and amount of the respective agricultural product? (further illustrated in fig. 4). Ex. 1004, [0028], [0040]. Dr. Giles explains that "[t]he mixing of compounds just prior to field application is common practice and has been since the dawn of agriculture." Ex. 1003, ¶ 182. "Given this long-standing practice and Wagers' focus on providing 'a desired type and amount of the respective agricultural product' based on seed type, as excerpted above, one of ordinary skill in the art would have been motivated to incorporate a mixer in the multi-row planter disclosed in Wagers." *Id.* According to Dr. Giles, "[s]uch mixers were well known at the time as reflected in Batcheller, and could have been readily incorporated in the Wagers planter." *Id.*

E. Ground 5: Claim 17 of the '027 Patent is Obvious over Wagers in view of Memory

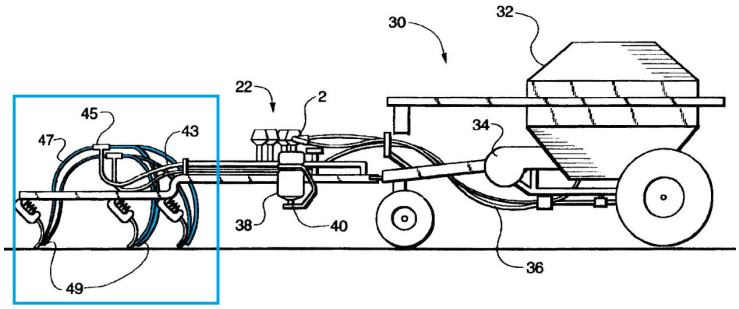
Memory is a U.S. patent titled "Method and Apparatus for Coating Seeds" and issued December 5, 2000, as U.S. Patent No. 6,155,185. Memory was filed on July 15, 1999. Ex. 1008, cover. Memory constitutes prior art under 35 U.S.C. § 102(a)(1).

Memory discloses a seed treatment method using a planter including a seed hopper 32, a seed meter 40, a tube 49 with a substance applicator 22 used to deposit a quantity of a seed applied substance uniformly to each seed through the seed flow path. Ex. 1008, 4:11-51; Ex. 1003, ¶ 79. Memory disclosed the seed treatment method utilizes an air tube to entrain the seeds and direct them through the device and seed deposition outlets, where the seeds enter the ground. Ex. 1008, 1:24-29, 2:66-3:5, 4:46-51; Ex. 1003, ¶ 79.

Memory discloses all elements of dependent claim 17 of the '027 Patent as shown below and confirmed by Dr. Giles in his declaration and attached claim charts. Ex. 1003, ¶¶ 184-88, 303 Appendix C.

US 12,102,027	Wagers (Ex. 1004) + Memory (Ex. 1008)
Claim 17. The method of claim 1**,** wherein the ***seed drop tube*** comprises an ***air tube***.	**Wagers (Ex. 1004):** *See* Section VIII.A above. **Memory (Ex. 1008):**

Fig. 3



(Col. 1:24-29) "Seeding implements are well known. Implements such as ***air seeders convey the seeds from the reservoir to the seed deposition outlets of the implement by means of a flow of air through conduits***. The air flow is derived from a fan or air compressor, which typically is mounted on the implement and powered by the prime mover, normally a tractor."

(Col. 2:66 – Col. 3:5) "The implement ***conveys seeds in a flow of air carried by conduits to entrain the seeds within the air flow***. The seed treating unit is placed on the implement remote from the storage tank for the seeds to receive airborne seeds from an inlet tube, treat the seeds with a coating material, and discharge the seeds through an outlet tube to planting mechanisms."

(Col. 4:46-51) "The outlets 3 of the devices 22 are connected to and in flow communication with corresponding transport tubes 43. The ***transport tubes 43 deliver coated seed to distributors 45 that operate to distribute the coated seeds to a plurality of delivery tubes connected to the seed deposition outlets 49 for depositing the coated seeds into the ground***."

Dr. Giles explains that "[s]eed drop tubes that use a flow of air to facilitate the discharge and planting of seeds, like those disclosed in Memory, were well

known and have been used in agricultural planters since well before the 2015 priority date of the 027 patent." Ex. 1003, ¶ 187. Further, "[o]ne of ordinary skill in the art would have recognized that the multi-row planter of Wagers could have been readily equipped with any number of seed drop tube types including air tubes, brush tubes, as well as gravity tubes." *Id.* "Each of these types of seed drop tubes would have furthered the express goal in Wagers of maximizing planting precision." *Id.*

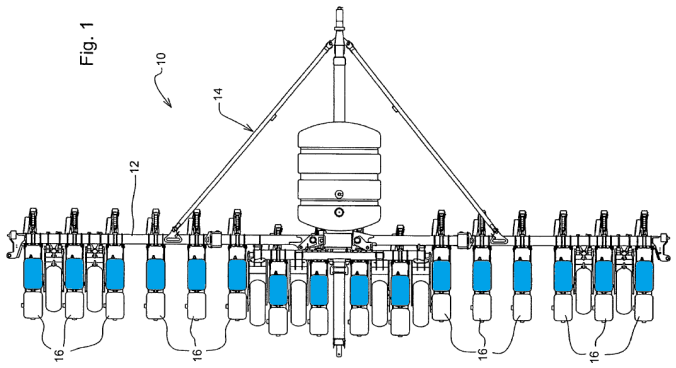
F. Ground 6: Claims 18 and 19 of the ''027 Patent are Obvious over Wagers in view of Garner

Garner is a U.S. patent titled "Seeding Machine and Seed Delivery System" and issued October 7, 2014 as U.S. Patent No. 8,850,995. Garner was filed on February 2, 2009. Ex. 1009, cover. Garner constitutes prior art under 35 U.S.C. § 102(a)(1).

Garner discloses a seed delivery system for use in a multi-row unit planter with row units 16 including a seed hopper 24, a seed meter 26, a seed brush tube 28, an opening disc 30, seed firmer wheels 32, and closing wheels 34. Ex. 1009, 3:1-19; Ex. 1003, ¶ 81. Garner disclosed the seed brush delivery system 28 "can be used in any of a variety of planting machine types" and recognized the "most common seed delivery may be categorized as a gravity drop system [with a seed tube]" which is prone to velocity differences between seeds "as each seed comes to rest" in the soil. Ex. 1009, 1:43-49, 3:24-27; Ex. 1003, ¶ 81.

Garner also disclosed the seed meter 26 uses "a vacuum disk" and transfers the seeds to the seed brush tube 26 including bristles and includes a seed accelerator through use of a belt where "bristle distal ends thus cause the linear speed of the seeds to accelerate relative to the speed of the belt base member 66 and the housing as shown by the two arrows 94 and 96. The seeds are then propelled by the bristles over the ramp 84 and discharged through the lower opening 78 into the seed trench." Ex. 1009, 3:8-10, 4:27-33; Ex. 1003, ¶ 81.

Garner discloses all elements of dependent claims 18 and 19 of the '027 Patent as shown below and confirmed by Dr. Giles in his declaration and attached claim charts. Ex. 1003, ¶¶ 189-94, 303 Appendix C.

US 12,102,027	Wagers (Ex. 1004) + Garner (Ex. 1009)
Claim 18. The method of claim 1, wherein the ***seed drop tube*** comprises ***a brush tube.***	**Wagers (Ex. 1004):** *See* Section VIII.A above. **Garner (Ex. 1009):** 

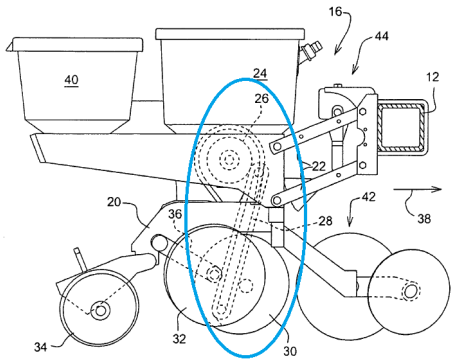
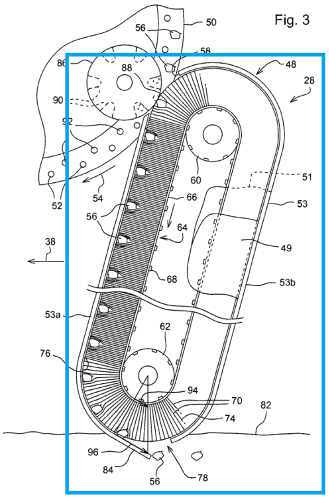


Fig. 2

Fig. 3



(Col. 3:40-54) "The seed delivery system housing 48 has spaced apart front and rear walls 49 and 51 and a side wall 53 therebetween. ***An upper opening 58 in the housing side wall 53 admits the seed from the metering disk 50 into the housing.*** A pair of pulleys 60, 62 are mounted inside the housing 48. The pulleys support a belt 64 for rotation within the housing. One of the pulleys is a drive pulley while the other is an idler pulley. ***The belt has a base member 66 to engage the pulleys and elongated bristles 70 extending therefrom. The bristles are joined to the base member at proximal, or radially inner, ends of the bristles. Distal, or radially outer, ends 74 of the bristles touch, or are close to touching, the inner surface 76 of the housing side wall 53.*** A lower housing opening 78 is formed in

	the side wall 53 and is positioned as close to the bottom 80 of the seed trench as possible." **(Col. 2:15-22)** "The present invention provides a ***seed delivery system that removes the seed from the seed meter by capturing the seed***. The delivery system then moves the seed … relative to the ground." **(Col. 4:27-33)** "The lower opening 78 and the ramp 84 are positioned along the curved belt path around the pulley 62. The ***bristle distal ends thus cause the linear speed of the seeds to accelerate relative to the speed of the belt base member 66 and the housing as shown by the two arrows 94 and 96. The seeds are then propelled by the bristles over the ramp 84 and discharged through the lower opening 78 into the seed trench***." *See also* Col. 2:22-30; Col. 2:65 - Col. 3:19.
Claim 19. The method of claim 1, wherein the ***seed drop tube*** comprises ***a seed accelerator***.	**Wagers (Ex. 1004):** *See* Section VIII.A above. **Garner (Ex. 1009):** *See* Claim 18 above.

As Dr. Giles explains, "[b]rush-type seed drop tubes, like those disclosed in Garner, were well known and have been used in agricultural planters since well before the 2015 priority date of the '027 patent. Ex. 1003, ¶ 193. "As reflected in the similarity between the multi-row planters disclosed in Wagers and Garner, one of ordinary skill in the art would have recognized that the multi-row planter of Wagers could have been readily equipped with any number of seed drop tube types including brush tubes, air tubes, as well as gravity tubes." *Id.* "Each of these types

of seed drop tubes would have furthered the express goal in Wagers of maximizing planting precision." *Id.* Garner discloses the brush meter as a way of reducing variation, i.e. improving accuracy of seed delivery. Ex. 1009, *Abstract,* 1:64 – 2:11; Ex. 1003, ¶ 193.

G. Ground 7: Claims 1-19 Lack Enablement Under 35 U.S.C. 112(a)

35 U.S.C. §112(a) requires a patent to describe the invention "in such full, clear, concise and exact terms as to enable a POSA to which it pertains, or with which it is most nearly connected, to make and use the same." *Id.* To satisfy the enablement requirement, a patent specification must teach those skilled in the art how to make and use the full scope of the claims without undue experimentation. *In re Wands*, 858 F.2d 731, 736-37 (Fed. Cir. 1988). "Claims are not enabled when, at the effective filing date of the patent, one of ordinary skill in the art could not practice their full scope without undue experimentation." *Wyeth & Cordis Corp. v. Abbott Lab'ys*, 720 F.3d 1380, 1384 (Fed. Cir. 2013). Several factors may be considered to evaluate undue experimentation, including: (1) the quantity of experimentation necessary, (2) the amount of guidance or direction presented, (3) the state of the art, (4) the nature of the invention, (5) the presence or absence of working examples, (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.*

The enablement requirement prevents patentees from claiming more than what was invented. By seeking "broad claim[s]" a patentee puts itself "at the peril of losing any claim that cannot be enabled across its full scope." *Magsil Corp. v. Hitachi Global Storage Techs., Inc.,* 687 F.3d 1377, 1384 (Fed. Cir. 2012). The Supreme Court has long recognized this principle. For example, *The Incandescent Lamp Patent* held the claims including "[a]n incandescing conductor for an electric lamp, of carbonized fibrous" were invalid and noted that had the patentees "discovered that a certain carbonized paper would answer the purpose, their claim to all carbonized paper would, perhaps, not be extravagant." *The Incandescent Lamp Patent*, 159 US 465, 476 (1895). That is, if "there were some general quality, running through the whole fibrous and textile kingdom, which distinguished it from every other… the man who discovered such quality might justly be entitled to a patent." *Id.*

Succinctly stated "[i]f a patent claims an entire class of processes … the patent's specification must enable a POSA to make and use the entire class." *Amgen Inc. v. Sanofi*, 598 U.S. 594, 610 (2023). That is, a patent "is not a reward for the search, but compensation for its successful conclusion." *Brenner v. Manson*, 383 U.S. 519, 536 (1966).

> "'Imagine a combination lock with 100 tumblers, each of which can be set to 20 different positions.' 'Through trial and error, imagine that an inventor finds and discloses 26 different successful lock combinations.' But imagine, too, 'that the inventor tries to claim much more, namely all successful

> combinations,' while instructing others 'to randomly try a large set of combinations and then record the successful ones.' Sure enough, that kind of 'roadmap' would produce functional combinations. But it would not enable others to make and use functional combinations; it would instead leave them to 'random trial-and-error discovery.'" *Amgen*, 598 U.S. at 614-615.

Thus, a patent that fails to explain how to make and use the full scope of the claims is invalid. *Id.* at 610.

The inclusion in a claim's scope of inoperative species is a relevant consideration in the enablement analysis, even though it does not, by itself, require finding the claims are enabled. *See, e.g.*, *Atlas Powder Co. v. E.I. Du Pont De Nemours & Co.*, 750 F.2d 1569, 1576-77 (Fed. Cir. 1984) ("if the number of inoperative combinations becomes significant, and in effect forces [a POSA] to experiment unduly … the claims might indeed be invalid."). However, a claim must demonstrate the "parametric relationships recited in the claims reasonably bound to" the invention such that the full scope could be produced by a POSA. *In re Cook*, 439 F.2d 730, 735-36 (C.C.P.A. 1971). As the Supreme Court has stated "it makes no difference, in this respect, whether the effect is produced by chemical agency or combination … or by machinery acting altogether upon mechanical principles. In either case he must describe the manner and process as above mentioned, and the end it accomplishes." *O'Reilly v. Morse*, 56 U.S. 62, 119 (1853).

The Board holds Patentees to the same standard. For example, in *US Endodontics v. Gold Standard*, the Board held the claims of the '991 Patent lacked enablement for the full scope of the claims because there was enough evidence to show the permanent deformation claimed would not result over the full range recited. *U.S. Endodontics, LLC, v. Gold Standard Instruments, LLC*, PGR2015-00019, No. 54 at 23-24 (Dec. 28, 2016). In particular, the Board emphasized the lack of operable species tested throughout the full temperature range as a substantial consideration in determining whether the claims were enabled. *Id.*

Finally, "it is the specification, not the knowledge of one skilled in the art, that must supply the novel aspects of an invention in order to constitute adequate enablement." *Auto. Techs. Int'l, Inc. v. BMW of N. Am., Inc.,* 501 F.3d 1274, 1284 (Fed. Cir. 2007). Otherwise, the specification provides "only a starting point, a direction for further research" and does not provide to a POSA how to make or use the invention. *Id.* at 1284. This is the situation with the '027 Patent.

As discussed below and in Dr. Giles's declaration, while generating a combination (i.e., applying a substance to a seed) "as it is being delivered to the soil" may appear straightforward, it inherently involves substantial challenges. One must account for the seed's individual characteristics to determine how it will travel within the seed's path. One must detect the seed to determine when and how to apply the substance within the seed's path. One must design a substance

applicator to determine when and how to apply the substance within the seed's path. However, these considerations only contemplate a single seed type and a single substance type. The claims of the '027 Patent expect far more from a POSA: they expect a POSA to be able to generate such combinations for any seed, with any substance, and at any level of granularity (e.g., seed-by-seed, field-by-field).

Without guidance, these expectations are too much. There is no disclosure of how to effectuate such a broad range of possibilities with any degree of accuracy and there is no discussion of the basic technical parameters to even get started. To work through this through trial and error is not practical, not routine, and not reasonable to expect. The '027 Patent overlooks all of this and more: it demonstrates a total lack of appreciation or understanding for the difficulties inherent in technology.

Therefore, the specification of the '027 Patent has failed to enable a POSA to practice the full scope of the prescriptive seed treatment method claims without undue experimentation because the claims recite an "entire class" of prescriptive seed treatment methods with no "general quality running through" the class and the specification provides nothing more than "a starting point" and "a direction for further research." *See Incandescent Lamp*, 159 US at 476; *Amgen*, 598 U.S. at 610; *Auto. Techs. Int'l,* 501 F.3d at 1284. That is, the specification of the '027 Patent does not enable a POSA to practice the full scope of claims 1-19 for reciting a

prescriptive seed treatment method which "generat[es] the combination of the seed and the selected type of the seed-applied substance at least in part by individually applying the desired application amount of the selected type of the seed-applied substance to each seed as it is being delivered to the soil." Claim 8 additionally lacks enablement as to "timing mechanism." Ex. 1003, ¶¶195-303.

1. The '027 Is Not Enabling For "Generating the Combination of the Seed and the … Seed-Applied Substance to Each Seed as It is Being Delivered to the Soil"

Following the disclosure of the '027 patent, a POSA would not be able to make or use the prescriptive seed treatment method using a "planter" with "a seed drop tube" to "[generate] the combination of the seed and the selected type of the seed-applied substance …as it is being delivered to the soil," across the full scope of the claims, without undue experimentation. Ex. 1003, ¶¶204-271.

(a) The '027 Patent is Not Enabling for "Seed"

The '027 patent states:

> As used herein, the term "seed" includes seeds of <u>any type of plants</u>, including row crops, cereals, grains, oilseeds, fruits, vegetables, turf, forage, ornamental, nuts, tobacco, plantation crops and the like.

Ex. 1001, 7:41-44. As such, the '027 patent makes clear a seed is *any* seed. However, all seeds are not created equal: they vary in size, shape, symmetry, as well as other physical characteristics. Ex. 1003, ¶¶216-20, 248-52. While some portions of the '027 patent specification may focus on corn and soybean, these

types of seeds are very different from tobacco, tomato, or lettuce seeds, which are also encompassed by the claims of the ’027 patent. Ex. 1001, claim 1; 7:41-44; Ex. 1003, ¶¶220, 226.

For example, a tobacco seed has a weight of about 0.08 to 0.09 mg and there are about 11,000 - 12,000 seeds per gram. In contrast, there are about 7 corn seeds per gram. This is roughly a 2,000X difference in size between tobacco and soy/corn seeds. Ex. 1003, ¶220. Therefore, It is unclear how a POSA would be able to use the same prescriptive seed treatment method claimed for any seed and “[generate] the combination of the seed and the selected type of the seed-applied substance…as it is being delivered to the soil,” without undue experimentation. *See* Ex. 1003, ¶¶215-26. Moreover, mass and shape also make seeds more susceptible to changes in air resistance when they are light and would have difficulty taking advantage of gravitational forces for efficient, predictable, and accurate planting and movement through a planter to a seed planting location. Small seeds also lack surface area which makes application of effective amounts of seed-applied substance difficult. Thus, a POSA cannot even be assured of delivery at regular intervals or proper dispensing of a seed-applied substance for all embodiments encompassed by the prescriptive method treatments of the ’027 Patent. Ex. 1003, ¶¶227-30. Therefore, the amount of experimentation needed to “generat[e] the

combination of [any] seed and the selected type of the seed-applied substance…as it is being delivered to the soil," across the full scope of the claims is undue. *Id.*

Notably, claim 1 of the '027 Patent is not limited to a single or a few inoperable embodiments. The list of inoperative seed types is extensive and encompasses: "fruits," which are mostly propagated by tree grafting, not planting seed, "vegetables" and "turf" which are mostly broadcast seeded, not by seed drop tubes, "ornamental" plants and "nut" crops, which are propagated from cuttings, not planted by seed, and "plantation crops," which are not propagated and planted as seed. Ex. 1001, 7:41-44.

In fact, enablement is lacking for any "seed"—even corn and soybean seeds. This is because to practice the full scope of the claims involving "[a] prescriptive seed treatment….[which involves] generating the combination of the seed and the selected type of the seed-applied substance …as it is being delivered to the soil," is not routine—let alone, implementable, without undue experimentation. Ex. 1001, claim 1. First, many seeds have a substantial deviation within their own seed lot, up to over 40%, which makes implementing the full scope of the invention of the '027 Patent unpredictable. Ex. 1003, ¶220. Second, with regards to embodiments involving applicators which apply seed-applied substances at metered amounts, rather than continuous spray to individually apply the substance to each seed, a POSA needs either a high degree of control or extensive sensing for detection of

the seed. *Id.*, ¶¶229-30. The inventors of the ’027 patent have not provided any guidance to a POSA in order to take these considerations into account. Therefore, merely “generating the combination of [any] seed and the selected type of the seed-applied substance…as it is being delivered to the soil,” across the full scope of the claims would require undue experimentation. *Id.*, ¶¶205-220.

(b) The ’027 Patent is Not Enabling for Generating the Combination “As It is Being Delivered to the Soil”

The claimed prescriptive seed treatment uses a “seed drop tube” as its mechanism to deliver the seeds to the soil. Seed drop tubes were well known around the time of filing of the ’027 Patent to have difficulty in maintaining accurate and consistent seed spacing at planting speeds of greater than 5mph. Ex. 1003, ¶240. In fact, the use of seed tubes to deliver the seeds to the seed furrow can have a negative effect on the uniformity of seed spacing because seeds descend through the seed tube by gravity often in a free-fall through the entire length of the seed tube. *Id.*, ¶241. Seeds contact and bounce off the walls of the seed tube in relatively random intervals. This leads to differences in the rates at which the seeds travel through the drop tube. Later-discharged seeds are even known to pass an earlier-discharged seed as both are delivered to the soil. *Id.*, ¶¶241-42.

While the ’027 patent may contain figures showing “application…of the seed-applied substance to each seed as it is being delivered to the soil…,” these purported embodiments are oversimplified and inconsistent with the real world. It

is clear that the specification provides no parameters for where or how to make the combination "as it is being delivered to the soil." *Id.*, ¶¶247-65.

The method of claim 1 requires a planter to carry out the prescriptive treatment process of the claims. To practice the full scope of claims 1-19 requires a system capable of delivering the "desired application" [dose and type of seed-applied substance] to the individual seed as it moves through the handling path in the planter as "it is being delivered to the soil." Given there is no limitation on seed type or doses of substances, practicing this method requires a system to not only be able to handle a variety of seed types and substances, but also operational conditions (planting rates, ground speeds, etc.). Because the specification does not provide specific components or even characteristics of components (e.g. nozzles, pumps, etc.), practicing the invention would require extensive design and selection of individual components. *Id.*

Thus, in order to accurately "generat[e] the combination … as it is being delivered to the soil," particularly for individual applications to each seed, a POSA would likely need seed sensors, yet to the extent the '027 Patent mentions sensors, they have nothing to do with the location of the seed or the travel of the seed through the seed flow path so as to accomplish it being delivered to the soil. For instance, the sole structure mentioned in the '027 patent that arguably relates to this step is a timing mechanism. Ex. 1001, 37:13-16; Ex. 1003, ¶234.

However, configuring such a precise timing mechanism could not be done without appropriately located sensors resulting in undue experimentation. Ex. 1003, ¶242. The ’027 Patent gives very little, if any, guidance as to how to configure the timing mechanism. In fact, in an “exemplary embodiment,” the timing mechanism is synchronized with the delivery of the seed to the seed drop tube. Ex. 1001, 37:34-38. Thus, the timing mechanism presented in the ’027 Patent would synchronize the generation of the combination as the seed begins to fall and would not be capable to account for the variability of the seed as it travels within the seed drop tube. Ex. 1003, ¶274.

Contrary to the figures shown in the ’027 patent, it is unclear what technology existed at the time of filing of the ’027 patent that would allow seeds to maintain such regular intervals and orientations through seed drop tubes. This would be required to apply the seed substance consistently and accurately. *Id.*, ¶293. Such teaching is certainly not in the ’027 patent. *Id.*

As any application system which could generate the “combination” as claimed, a POSA would first need to determine a myriad of relevant parameters on which control could be exerted. *Id.*, ¶¶247-65. These parameters shown in Tables 1-6 include: the kind of sensor to define a seed’s trajectory through the seed drop tube, the location of the sensor, the nozzle, the placement and orientation of the nozzle, the nozzle control system including the kind of valve or pump, and a

variety of planting and environmental parameters. *Id.*, ¶¶253-60. Once an initial list of possible parameters was determined, it would then be necessary to actually test those parameters to see if sufficient control could even be exerted. *Id.*, ¶267. Such testing would include the restructuring of large portions of the equipment to find, *e.g.*, where vibration has the least impact. *Id.* Despite this complexity of implementation, the '027 patent discloses that "generating the combination" can be anywhere along the seed flow path. *Id.*, Ex. 1001, 18:5-7; 21:46-49. This complete lack of guidance regarding applicable parameters and their thresholds would require a POSA to use undue experimentation. Ex. 1003, ¶¶266-71.

For example, such a system would need to take into account the variability in surface area for each seed and each seed type, which can vary anywhere from 2.5 to 6.8 times in surface area depending on the particular orientation the seed travels through the seed drop tube. Further, application amounts contemplated by the full scope of the invention would have to consider a range between the range of "milli" treatments and "pico" or "micro" treatments. The substance application amount further affects the selection of the nozzle and the applicator's control system. To practice the full scope of the claims, a POSA would have to consider a range of pressure up to 49 times the required flow rate of the substance, which varies by the cross-sectional area of the nozzle and the density of the seed applied substance. Ex. 1003, ¶258. The technology for creating a wide range of dispensed

spray volumes in a rapid time event (e.g., 10 msec) was not known at the time of the patent of the '027 filing. *Id.* Moreover, design, fabrication, and control of a dispensing system with 3-9 orders of magnitude range is extremely challenging and not found in industrial liquid dispensing systems in general and especially not in planters implementing prescriptive seed treatments. *Id.*, ¶259.

In fact, the lack of enablement is highlighted by the prosecution of the '027 patent. During the prosecution, Patentee stated "applicant's invention is directed to micro seed application… [via] a micro nozzle that deposits pico scale amounts to the seed," showing the full scope of the claims contemplated include "pico" and "micro" amounts. Ex. 1002, 246. Further, Patentee admitted during the interview, that the nozzle requires a "special design." *Id.* Yet, this element is not discussed in the specification, which merely states the prescribed combination can be "seed-by-seed, row-by-row, column-by-column, zone-by-zone, region-by-region, field-by-field and/or across multiple fields". Ex. 1001, 36:59-65; Ex. 1003, ¶¶255-59. Such a statement is further illustration that the Patentee failed to teach a POSA how to practice the full scope of the claims without undue experimentation, where a system would have to consider all of the parameters and be capable of implementing any prescriptive seed treatment across a significant range.

Finally, overspray is a significant issue in dispensing seed treatments in general and changing the type of substance used affects producing a predictable

and consistent spray across multiple types of seed applied substances even more. Overspray is particularly problematic because it has the potential to coat the inside the seed drop tube as the seed falls through it and cause further issues in seed spacing and underlying planting operations. The ’027 Patent highlights this issue by including flushing mechanisms designed to remove substance residue in the seed drop tube. Ex. 1001, 14:26-35, Ex. 1003, ¶239. However, there is no disclosure as to how a POSA is to accomplish the flushing without diluting future applications of seed-applied substances.

As no limitations on seeds or types and doses of substances are stated in the claims or description, practicing the invention inherently requires the system be capable of functioning with a variety of seeds, substances and operational conditions (e.g., planting rates, ground speeds, overspray, etc.). And as discussed previously, the specification of the ’027 Patent does not even enable a POSA to practice the full scope of the method to function with a single seed type. Ex. 1003, ¶¶205-30. Because the specification does not teach specific components or characteristics of the components, practicing the invention with a variety of seeds, substances, and operational conditions would require extensive design and selection of individual components and excessive prototyping and experimentation to achieve the stated objectives of the invention. *Id.*, ¶¶266-71.

Therefore, "generating the combination of [any] seed and the selected type of the seed-applied substance…as it is being delivered to the soil," would require undue experimentation and does not enable a POSA to practice the full scope of the prescriptive seed treatment methods of claims 1-19. *Id.*, ¶¶231-71.

2. The '027 Patent is Not Enabled for "Individually Applying … the Seed-Applied Substance to Each Seed As It Is Being Delivered to the Soil"

A POSA would not be able to make or use the full scope of the claimed prescriptive seed treatment method which "individually appl[ies] … the selected type of the seed-applied substance to each seed as it is being delivered to the soil." As it reads in light of the specification, the claim is broad and even encompasses applying an on-the-fly selection of an applied substance for each seed that falls through the seed drop tube. Moreover, the '027 Patent specification states "the substance applicator 42 could ... quickly individually apply each of the relevant seed-applied substances from each of the relevant substance delivery tubes 52 as the seed traverses past the substance applicator 42." Ex. 1001, 17:45-50. In fact, the Patentee has argued that such a term includes "a precise, seed-by-seed treatment, i.e., individual treatment of individual seeds." Ex. 1025, 54.

However, such a prescriptive treatment method would have required undue experimentation given the lack of working examples, the lack of direction provided by the inventor, the complexity of prescriptive treatment planters, and the prior art

around the time of the filing of the ’027 Patent provides strong evidence that such a “seed-by-seed treatment” would be nearly impractical if not impossible. Ex. 1003, ¶¶272-303.

First, as described above, because the ’027 Patent uses seed drop tubes, seed variability as the seeds travel through the seed drop tube make it nearly impossible to account for each seed individually. As such, all the same reasons explaining why the claimed method is not enabled in the sections above, also apply here.

Second, because the claims encompass seed-by-seed treatment, the claims also encompass seed-by-seed treatment of different seed types. For example, the scope of the claims cover treating a corn seed with one selected substance and a soybean seed with a different selected substance immediately following thereafter.

However, the prior art around the time of the filing of the ’027 Patent demonstrates that this level of granularity was not known to be implementable in real world conditions. For example, both Garner ‘894 and Wendte ‘802 disclose systems utilizing seed drop tubes that allow the planting of different seed varieties. Ex. 1027, 3:56-62; Ex. 1028, 1:57-2:4. However, both systems recognize that mixing of seeds will occur when switching between the seed types, so the devices cannot account for planting different seed types at a seed-per-seed level. That is, prescriptive planting devices are still designed at the field area level in mind. Ex. 1003, ¶282.

Moreover, these prior art devices included detailed description of their metering devices to be capable of reliably switching seed types even for area-by-area planting. No specific seed meter is disclosed in the ’027 Patent which would be required for the prescriptive method to apply an individual treatment for a different seed type at the seed-per-seed level. For example, the ’027 Patent suggests that any known seed meter to one of ordinary skill in the art would suffice. Ex. 1001, 10:4-22. This suggestion is not enablement.

Considering the mechanism for dispensing the seed-applied substance, as discussed earlier, there are two sources of significant challenge in practicing the claims of the invention. The issues of seed variability have been discussed. Similarly, the range of rates or “dose” quantity of the substance and the range of substance characteristics has been illustrated. Accomplishing the simultaneous and coincident impact of the seed and the mass of substance for each seed on a seed-by-seed basis requires spray and atomization technology that was not provided for in the ‘027 Patent at the time of filing. Ex. 1003, ¶300. The amount of experimentation required to practice the full scope of the claims thus requires time additive and multiplicative effects of the range of seed characteristics, the range of prescriptive dose (amount) of seed-applied substance to be applied and the range of characteristics of potential seed-applied substance mixtures and at least those discussed in Tables 1-6 Dr. Giles’s declaration. *Id.*, ¶¶285-89. Thus, a POSA

would have no reasonable expectation of success or predictability in the results based on the lack of enablement of the ‘027 Patent. *Id.*, ¶¶272-302.

As a result, the ’027 Patent lacks the necessary disclosure of the features to enable a POSA to practice the full scope of the claimed prescriptive seed treatment method which “individually apply[ies] … the selected type of the seed-applied substance to each seed as it is being delivered to the soil,” and is attempting to pre-empt the field.

This situation is analogous to *Auto Techs. Int’l*. In that case, the claims encompassed both mechanical sensors and electronic sensors for detecting side collisions. *Auto. Techs. Int’l,* 501 F.3d at 1283. Mechanical sensors were known in the art to be used in such scenarios, but at the time it was unknown how an electronic sensor would do the same. *Id.* The court found that while the mechanical sensors were enabled, the “[d]isclosure of only mechanical side impact sensors does not permit one skilled in the art to make and use the invention as broadly as it was claimed. Thus, in order to fulfill the enablement requirement, the specification must enable the full scope of the claims that includes both electronic and mechanical side impact sensors, which the specification fails to do.” *Id.* at 1285.

Here, like *Auto. Techs. Int’l*, the claims are broad and encompass generating combinations of seed and seed applied supplied substances for *any* seed, the claims encompass generating combinations using *any* seed applied substances, using

"many different types of spraying and/or applying technologies," (Ex. 1001, 12:42-48) on "a seed-by-seed", "zone-by-zone" and "field-by-field" (*Id.*, 36:59-65), applying the seed-applied substances to the seed anywhere along the path as the seed is delivered to the soil (*Id.*, 13:21-36), and applying the seed applied substance at a low rate, mid rate, or high rate (*Id.*, 37:63-67). Moreover, like in *Auto Techs Int'l*, the Patentee admitted during prosecution the novelty of the invention contemplated by the scope of the claims included the generating combinations using applications on a "micro" rather than "macro" scale (i.e., the "seed-by-seed" applications), which required a nozzle with "a special design for dispensing the treatment to the seed." Ex. 1002, 246. And like *Auto. Techs. Int'l*, none of this information was disclosed in the '027 Patent.

Thus, the Patentee has only provided a wishful roadmap that, while it could produce functional combinations, it leaves a POSA to randomly try a large set of combinations through trial-and-error discovery. *Amgen*, 598 U.S. at 614-615. The patentee put itself "at the peril of losing any claim that cannot be enabled across its full scope of coverage." *Magsil Corp.,* 687 F.3d at 1384. As a result, claims 1-19 fail to enable a POSA to practice to full scope of the claimed prescription treatment method without undue experimentation and are invalid.

IX. CONCLUSION

Petitioner respectfully requests that the Board institute a Post-Grant Review of claims 1-19 on the grounds set forth above.

Respectfully submitted,

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CERTIFICATE OF WORD COUNT

The undersigned hereby certifies that the foregoing PETITION FOR POST-GRANT REVIEW has 18,699 words, in compliance with the 18,700 word limit set forth in 37 C.F.R. § 42.24 as computed by Microsoft Word, excluding the parts of this petition that are exempted by 37 C.F.R. § 42.24(a)(1) including the table of contents, table of authorities, mandatory notices, a certificate of service, this certificate of word count, appendix of exhibits or and claims listing).

Date: July 1, 2025

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), I hereby certified that a copy of the foregoing PETITION FOR POST-GRANT REVIEW was provided via UPS OVERNIGHT DELIVERY to the Patent Owner by serving the correspondence address of record for the 12,102,027 Patent:

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