US009408337B2

(12) **United States Patent**
Sauder et al.

(10) **Patent No.: US 9,408,337 B2**
(45) **Date of Patent: Aug. 9, 2016**

(54) **AGRICULTURAL ROW UNIT APPARATUS, SYSTEMS AND METHODS**

(75) Inventors: **Derek A. Sauder**, Tremont, IL (US); **Timothy A. Sauder**, Tremont, IL (US)

(73) Assignee: **Precision Planting LLC**, Tremont, IL (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 28 days.

(21) Appl. No.: **14/122,622**

(22) PCT Filed: **Jun. 4, 2012**

(86) PCT No.: **PCT/US2012/040729**

§ 371 (c)(1),
(2), (4) Date: **Nov. 26, 2013**

(87) PCT Pub. No.: **WO2012/167244**

PCT Pub. Date: **Dec. 6, 2012**

(65) **Prior Publication Data**

US 2014/0090585 A1 Apr. 3, 2014

Related U.S. Application Data

(60) Provisional application No. 61/493,200, filed on Jun. 3, 2011.

(51) **Int. Cl.**
A01B 5/04 (2006.01)
A01B 49/02 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***A01B 5/04*** (2013.01); ***A01B 49/027*** (2013.01); ***A01B 49/06*** (2013.01); ***A01C 5/064*** (2013.01); ***A01C 5/068*** (2013.01)

(58) **Field of Classification Search**
CPC A01B 5/04; A01B 5/00; A01B 49/06; A01B 49/04; A01B 49/00; A01B 49/027; A01B 49/02; A01C 5/068; A01C 5/066; A01C 5/06; A01C 5/00; A01C 5/064; A01C 5/062
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,691,353 A 10/1954 Secondo
5,398,771 A 3/1995 Hornung et al.
(Continued)

FOREIGN PATENT DOCUMENTS

NL 1026443 C 2/2006
WO 2004004437 A1 1/2004
WO 2006096072 A1 9/2006

OTHER PUBLICATIONS

Great Plains Manufacturing, Parts Manual Discovator (Disc and Coulter) Series VII, Feb. 12, 2009, Salina, KS (available at http://www.greatplainsmfg.com/manuals/pdf/550-220p.pdf).

Primary Examiner — Christopher J Novosad
(74) *Attorney, Agent, or Firm* — Thomas J. Oppold; Larkin Hoffman Daly & Lindgren, Ltd.

(57) **ABSTRACT**

An agricultural row unit apparatus, systems, methods for effectively creating a trench having an improved configuration and for improved product placement in or near the trench wherein the trench has a vertical sidewall and an angled sidewall. In some embodiments, a cavity is created adjacent the bottom of the trench. In some embodiments, the depth of the trench is maintained by a gauge wheel compacting soil adjacent to the angled sidewall. In some embodiments, fertilizer or other liquid or crop input is placed in the soil on the side of the trench opposite the gauge wheel. In some embodiments, two trenches each having a vertical sidewall and an angled sidewall are created by a single row unit.

20 Claims, 17 Drawing Sheets