

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To: SEAN P. RITCHIE
SAUL EWING LLP
CENTRE SQUARE WEST
1500 MARKET STREET, 38TH FLOOR
PHILADELPHIA, PA 19102

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing
(day/month/year)

JUN 13 2024

Applicant's or agent's file reference

385704-1014WO1-00212

FOR FURTHER ACTION See paragraphs 1 and 4 below

International application No.

PCT/US 24/15929

International filing date
(day/month/year)

15 February 2024 (15.02.2024)

Applicant THE CARLSTAR GROUP LLC

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

How? Directly to the International Bureau preferably through ePCT, or on paper to:
The International Bureau of WIPO, 34, chemin des Colombettes, 1211 Geneva 20, Switzerland

For more detailed instructions, see the *PCT Applicant's Guide*, International Phase, paragraphs 9.004 – 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.
3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.
- ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Reminders

The applicant may **submit comments on an informal basis on the written opinion of the International Searching Authority** to the International Bureau. These comments will be made available to the public after international publication. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established.

Shortly after the expiration of **18 months from the priority date**, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for **entry into the national phase** before those designated Offices. In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months. For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

Within **22 months from the priority date**, the applicant may request that a **supplementary international search** be carried out by a different International Searching Authority that offers this service (Rule 45bis.1). The procedure for requesting supplementary international search is described in the *PCT Applicant's Guide*, International Phase, paragraphs 8.006-8.032.

Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-8300

Authorized officer

Kari Rodriquez

Telephone No. PCT Helpdesk: 571-272-4300

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 385704-1014WO1-00212		FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/US 24/15929	International filing date (<i>day/month/year</i>) 15 February 2024 (15.02.2024)	(Earliest) Priority Date (<i>day/month/year</i>) 15 February 2023 (15.02.2023)	
Applicant THE CARLSTAR GROUP LLC			

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of:



the international application in the language in which it was filed.



a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II).

3. ☐ **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 2



as suggested by the applicant.



as selected by this Authority, because the applicant failed to suggest a figure.



as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 24/15929

A. CLASSIFICATION OF SUBJECT MATTER

IPC - INV. A01C 5/06, A01C 5/00, A01B 29/04 (2024.01)

ADD. A01B 35/28, A01B 49/06, A01B 21/08, A01B 35/16 (2024.01)

CPC - INV. A01C 5/066, A01C 5/068, A01C 5/06, A01C 5/00, A01B 29/04

ADD. A01B 35/28, A01B 49/06, A01B 21/08, A01B 35/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

See Search History document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

See Search History document

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

See Search History document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2016/0128266 A1 (OTICO) 12 May 2016 (12.05.2016), entire document, especially Fig. 1-9; para[0040]; para[0092]; para[0050]; para[0055]; para[0063]; para[0061]; para[0065];	1-13, 16-17
X	US 2018/0014454 A1 (YETTER MANUFACTURING COMPANY) 18 January 2018 (18.01.2018), entire document, especially Fig. 1-9; para[0020]; para[0021]; para[0023]; para[0026]; para[0027]; para[0025];	1, 14-15
A	US 5,896,932 A (Bruns et al.) 27 April 1999 (27.04.1999), entire document	1-17
A	US 2011/0155031 A1 (Arnett et al.) 30 June 2011 (30.06.2011), entire document	1-17
A	US 8,291,998 B1 (Berg et al.) 23 October 2012 (23.10.2012), entire document	1-17
A	EP 3,850,933 A1 (AMAZONEN-WERKE H. DREYER SE & CO. KG) 21 July 2021 (21.07.2021), entire document	1-17
A	US 2018/0317377 A1 (Freed) 08 November 2018 (08.11.2018), entire document	1-17

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"D" document cited by the applicant in the international application

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

02 May 2024 (02.05.2024)

Date of mailing of the international search report

JUN 13 2024

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents

P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-8300

Authorized officer

Kari Rodriguez

Telephone No. PCT Helpdesk: 571-272-4300

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To: SEAN P. RITCHIE SAUL EWING LLP CENTRE SQUARE WEST 1500 MARKET STREET, 38TH FLOOR PHILADELPHIA, PA 19102
--

Date of mailing <i>(day/month/year)</i>	JUN 13 2024
FOR FURTHER ACTION See paragraph 2 below	

Applicant's or agent's file reference 385704-1014WO1-00212		
International application No. PCT/US 24/15929	International filing date <i>(day/month/year)</i> 15 February 2024 (15.02.2024)	Priority date <i>(day/month/year)</i> 15 February 2023 (15.02.2023)
International Patent Classification (IPC) or both national classification and IPC IPC - INV. A01C 5/06, A01C 5/00, A01B 29/04 (2024.01) ADD. A01B 35/28, A01B 49/06, A01B 21/08, A01B 35/16 (2024.01) CPC - INV. A01C 5/066, A01C 5/068, A01C 5/06, A01C 5/00, A01B 29/04 ADD. A01B 35/28, A01B 49/06, A01B 21/08, A01B 35/16		
Applicant THE CARLSTAR GROUP LLC		

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Date of completion of this opinion 02 May 2024 (02.05.2024)	Authorized officer Kari Rodriguez PCT Help Desk Telephone No. 571-272-4300
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WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 24/15929

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - ☒ the international application in the language in which it was filed.
 - ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(b)).
3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
 - a. ☐ forming part of the international application as filed.
 - b. ☐ furnished subsequent to the international filing date for the purposes of international search (Rule 13ter.1(a)),
☐ accompanied by a statement to the effect that the sequence listing does not go beyond the disclosure in the international application as filed.
4. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, this opinion has been established to the extent that a meaningful opinion could be formed without a WIPO Standard ST.26 compliant sequence listing.
5. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 24/15929

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	None	YES
	Claims	1-17	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-17	NO
Industrial applicability (IA)	Claims	1-17	YES
	Claims	None	NO

2. Citations and explanations:

Claims 1-6, 10-13 and 16-17 lack novelty under PCT Article 33(2) as being anticipated by US 2016/0128266 A1 to OTICO. [FIRST TREATMENT]

Regarding claim 1, OTICO discloses a spiked closing wheel (1, Fig. 1-9; para[0040], 'an agricultural implement in the form of a wheel 1'; para[0092], 'Such a configuration makes it possible, for example, to close a furrow 151 at the bottom of which a grain 153 has been deposited') comprising:
a body portion (2, 3, Fig. 1-9 - see body comprising the wheel body 2 and the annular body of tire 3 comprising the sole 21, tread 23, sidewall 25 and internal portion 51 of sidewall 27; para[0044], 'The assembly formed by the two flanges 5, 7 and the fasteners 9 can be seen as at least one part of a wheel body 2'; para[0050], 'The tyre 3 has an annular overall shape centred on the axis of rotation XX. The tyre 3 comprises a sole 21, a tread 23 and a pair of sidewalls 25, 27. The sidewalls 25, 27 connect the sole 21 to the tread 23'; para[0055], 'The first sidewall 25 extends from the sole 21 to the tread 23. The second sidewall 27 comprises an internal portion 51 which extends from the sole 21 to the tread 23 and an external portion 53 projecting from the tread 23') having:
a first side (7, 51, Fig. 1-9 - see first side defined by flange 7 and sidewall portion 51; para[0044], 'The assembly formed by the two flanges 5, 7 and the fasteners 9 can be seen as at least one part of a wheel body 2'; para[0055], 'The second sidewall 27 comprises an internal portion 51 which extends from the sole 21 to the tread 23');
a second side (5, 25, Fig. 1-9 - see second side defined by flange 5 and sidewall 25; para[0044], 'The assembly formed by the two flanges 5, 7 and the fasteners 9 can be seen as at least one part of a wheel body 2'; para[0055], 'The first sidewall 25 extends from the sole 21 to the tread 23'); and
an outer surface extending between the first side and the second side (23, Fig. 1-9; para[0050], 'a tread 23'); and
a plurality of teeth extending outwardly from the outer surface (63, Fig. 1-9 - see teeth 63 extending outwardly from the outer surface 23; para[0066], 'The external portion 53 of the second sidewall 27 comprises teeth 63. The teeth 63 are distributed around the periphery of the external portion 53');
wherein at least one of the teeth extends from the outer surface at an angle with respect to a plane perpendicular to an axis of rotation of the wheel (Fig. 6, 8-9 - see how the teeth 63 extend from the outer surface 23 at an angle alpha with respect to a plane perpendicular to an axis of rotation XX of the wheel; para[0061], 'the external portion 53 of the second sidewall 27 bears a lateral surface 57 away from the lateral surface 55 and oriented towards the first sidewall 25... the lateral surface 57 has a profile inclined at a non-zero angle with respect to a radial plane. As seen in cross section, the lateral surface 57 forms an angle a (alpha) with a radial plane. The angle a is measured, in cross section, between the lateral surface 57 and a straight line perpendicular to the axis of rotation XX passing through the second sidewall 27, as is shown in FIG. 6. The angle a is between 0 degrees and 90 degrees'; para[0065], 'The angle a is between 10 degrees and 45 degrees, for example around 25 degrees, here').

Regarding claim 2, OTICO discloses the spiked closing wheel of claim 1, and further teaches the wheel further comprising:
an inner annular surface (Fig. 1-9 - see inner annular surface defining the central hub for receiving the bearing 11; para[0045], 'The wheel body 2 has a through-opening centred on the axis of rotation XX. Those parts of the wheel body 2 that surround the opening form a hub of the wheel 1. This opening is shaped into an open housing that is able to accommodate the bearing assembly 11');
wherein the outer surface forms a corresponding outer annular surface (23, 61, Fig. 1-9 - see how the outer surface 23 forms a corresponding outer annular surface 61; para[0050], 'a tread 23'; para[0058], 'The tread 23 bears an exterior surface 61').

Regarding claim 3, OTICO discloses the spiked closing wheel of claim 2, and further teaches wherein the inner annular surface defines an opening extending between the first side and the second side (Fig. 1-9 - see inner annular surface defining the central hub for receiving the bearing 11, said opening extending between the first and second sides; para[0045], 'The wheel body 2 has a through-opening centred on the axis of rotation XX. Those parts of the wheel body 2 that surround the opening form a hub of the wheel 1. This opening is shaped into an open housing that is able to accommodate the bearing assembly 11').

Regarding claim 4, OTICO discloses the spiked closing wheel of claim 3, and further teaches wherein the opening is concentric with the axis of rotation (Fig. 1-9 - see how the central opening is concentric with the axis of rotation XX, since the wheel body 2 is centered about the axis of rotation XX; para[0045], 'The wheel body 2 has a through-opening centred on the axis of rotation XX. Those parts of the wheel body 2 that surround the opening form a hub of the wheel 1'; para[0050], 'The tyre 3 has an annular overall shape centred on the axis of rotation XX').

-*-Continued in Supplemental Box-*

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 24/15929

Box No. VI Certain documents cited

1. Certain published documents (Rules 43*bis*.1 and 70.10)

Application No.
Patent No.

Publication date
(day/month/year)

Filing date
(day/month/year)

Priority date (valid claim)
(day/month/year)

2. Non-written disclosures (Rules 43*bis*.1 and 70.9)

Kind of non-written disclosure

Date of non-written disclosure
(day/month/year)

Date of written disclosure
referring to non-written disclosure
(day/month/year)

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 24/15929

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

-Box V.2 - Citations and Explanations-

Regarding claim 5, OTICO discloses the spiked closing wheel of claim 3, and further teaches wherein the opening is arranged and disposed for direct mounting to a frame (Fig. 1-9 - see how the opening of the hub is arranged and disposed for direct mounting a frame; para[0047], 'The bearing assembly 11 has a bore that is centred on the axis of rotation XX and opens onto each side of the wheel body 2. The bore in the bearing assembly 11 is designed to be slipped onto an axle of an agricultural machine').

Regarding claim 6, OTICO discloses the spiked closing wheel of claim 5, and further teaches wherein the opening comprises a bearing (11, Fig. 1-9; para[0045], 'The wheel body 2 has a through-opening centred on the axis of rotation XX. Those parts of the wheel body 2 that surround the opening form a hub of the wheel 1. This opening is shaped into an open housing that is able to accommodate the bearing assembly 11').

Regarding claim 10, OTICO discloses the spiked closing wheel of claim 1, and further teaches wherein the body portion comprises a first body section reversibly secured to a second body section (5, 7, Fig. 1-9 - see how the body portion includes flanges 5 and 7, with the first body section defined as the first flange 5, and the second body section defined as the second flange 7, said flanges being reversibly secured to each other via fasteners 9; para[0044], 'The assembly formed by the two flanges 5, 7 and the fasteners 9 can be seen as at least one part of a wheel body 2'; para[0045], 'The wheel body 2 has a through-opening centred on the axis of rotation XX. Those parts of the wheel body 2 that surround the opening form a hub of the wheel 1. This opening is shaped into an open housing that is able to accommodate the bearing assembly 11'; para[0052], 'The heel 31 is designed in a manner corresponding to the shape of the wheel body 2, and in particular in a manner corresponding to the shape of the peripheral rims of the flanges 5, 7. As can be seen in FIG. 6, when the flanges 5, 7 are mounted on one another, the peripheral rims of the flanges 5, 7 in the form of hooks grip the constriction 33 of the heel 31').

Regarding claim 11, OTICO discloses the spiked closing wheel of claim 10, and further teaches wherein the plurality of teeth are removably secured between the first body section and the second body section (Fig. 1-9 - see how the teeth 62, with the tire portion 3, are removably secured between the first and second body sections 5, 7; para[0044], 'The assembly formed by the two flanges 5, 7 and the fasteners 9 can be seen as at least one part of a wheel body 2'; para[0045], 'The wheel body 2 has a through-opening centred on the axis of rotation XX. Those parts of the wheel body 2 that surround the opening form a hub of the wheel 1. This opening is shaped into an open housing that is able to accommodate the bearing assembly 11'; para[0052], 'The heel 31 is designed in a manner corresponding to the shape of the wheel body 2, and in particular in a manner corresponding to the shape of the peripheral rims of the flanges 5, 7. As can be seen in FIG. 6, when the flanges 5, 7 are mounted on one another, the peripheral rims of the flanges 5, 7 in the form of hooks grip the constriction 33 of the heel 31').

Regarding claim 12, OTICO discloses the spiked closing wheel of claim 1, and further teaches wherein each of the plurality of teeth extends outwardly from the outer surface at an angle of at least 5 degrees with respect to the plane (Fig. 6, 8-9 - see how each of the teeth extends outwardly from the outer surface 23 at an angle of at least 5 degrees, said angle being 25 degrees; para[0061], 'the external portion 53 of the second sidewall 27 bears a lateral surface 57 away from the lateral surface 55 and oriented towards the first sidewall 25... the lateral surface 57 has a profile inclined at a non-zero angle with respect to a radial plane. As seen in cross section, the lateral surface 57 forms an angle α (alpha) with a radial plane. The angle α is measured, in cross section, between the lateral surface 57 and a straight line perpendicular to the axis of rotation XX passing through the second sidewall 27, as is shown in FIG. 6. The angle α is between 0 degrees and 90 degrees'; para[0065], 'The angle α is between 10 degrees and 45 degrees, for example around 25 degrees, here').

Regarding claim 13, OTICO discloses the spiked closing wheel of claim 1, and further teaches wherein each of the plurality of teeth extends outwardly from the outer surface at an angle of between 5 degrees and 30 degrees with respect to the plane (Fig. 6, 8-9 - see how each of the teeth extends outwardly from the outer surface 23 at an angle between 5 degrees and 30 degrees, said angle being 25 degrees; para[0061], 'the external portion 53 of the second sidewall 27 bears a lateral surface 57 away from the lateral surface 55 and oriented towards the first sidewall 25... the lateral surface 57 has a profile inclined at a non-zero angle with respect to a radial plane. As seen in cross section, the lateral surface 57 forms an angle α (alpha) with a radial plane. The angle α is measured, in cross section, between the lateral surface 57 and a straight line perpendicular to the axis of rotation XX passing through the second sidewall 27, as is shown in FIG. 6. The angle α is between 0 degrees and 90 degrees'; para[0065], 'The angle α is between 10 degrees and 45 degrees, for example around 25 degrees, here').

Regarding claim 16, OTICO discloses the spiked closing wheel of claim 1, and further teaches wherein an apex of each of the teeth is axially offset with respect to a centerline of the body portion (59, Fig. 1, 6 - see how an apex 59 of each of the teeth 63 is axially offset with respect to a centerline of the body, said apex 59 being located adjacent to the first side 51; para[0064], 'The orientations of the lateral surface 55 and of the lateral surface 57 give the external portion 53 a profile in the shape of a point. The radial end of the external portion 53 is cut off. In other words, the external portion 53 has a peripheral surface 59').

Regarding claim 17, OTICO discloses the spiked closing wheel of claim 16, and further teaches wherein the offset is up to a distance of half the width of the body portion (59, Fig. 1, 6 - see how an apex 59 of each of the teeth 63 is axially offset from the centerline up to a distance of half the width, since the apex does not extend laterally past the first side 51; para[0064], 'The orientations of the lateral surface 55 and of the lateral surface 57 give the external portion 53 a profile in the shape of a point. The radial end of the external portion 53 is cut off. In other words, the external portion 53 has a peripheral surface 59').

-Continued in next Supplemental Box-

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 24/15929

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

-*-Supplemental Box - Box V.2 - Citations and Explanations--*

Claims 1-3 and 7-9 lack novelty under PCT Article 33(2) as being anticipated by OTICO. [SECOND TREATMENT]

Regarding claim 1, OTICO discloses a spiked closing wheel (1, Fig. 1-9; para[0040], 'an agricultural implement in the form of a wheel 1'; para[0092], 'Such a configuration makes it possible, for example, to close a furrow 151 at the bottom of which a grain 153 has been deposited') comprising:

a body portion (3, Fig. 1-9 - see body comprising the annular body of tire 3 comprising the sole 21, tread 23, sidewall 25 and internal portion 51 of sidewall 27; para[0050], 'The tyre 3 has an annular overall shape centred on the axis of rotation XX. The tyre 3 comprises a sole 21, a tread 23 and a pair of sidewalls 25, 27. The sidewalls 25, 27 connect the sole 21 to the tread 23'; para[0055], 'The first sidewall 25 extends from the sole 21 to the tread 23. The second sidewall 27 comprises an internal portion 51 which extends from the sole 21 to the tread 23 and an external portion 53 projecting from the tread 23') having:

a first side (51, Fig. 1-9; para[0055], 'The second sidewall 27 comprises an internal portion 51 which extends from the sole 21 to the tread 23');
a second side (25, Fig. 1-9; para[0055], 'The first sidewall 25 extends from the sole 21 to the tread 23'); and
an outer surface extending between the first side and the second side (23, Fig. 1-9; para[0050], 'a tread 23'); and
a plurality of teeth extending outwardly from the outer surface (63, Fig. 1-9 - see teeth 63 extending outwardly from the outer surface 23; para[0066], 'The external portion 53 of the second sidewall 27 comprises teeth 63. The teeth 63 are distributed around the periphery of the external portion 53');

wherein at least one of the teeth extends from the outer surface at an angle with respect to a plane perpendicular to an axis of rotation of the wheel (Fig. 6, 8-9 - see how the teeth 63 extend from the outer surface 23 at an angle α with respect to a plane perpendicular to an axis of rotation XX of the wheel; para[0061], 'the external portion 53 of the second sidewall 27 bears a lateral surface 57 away from the lateral surface 55 and oriented towards the first sidewall 25... the lateral surface 57 has a profile inclined at a non-zero angle with respect to a radial plane. As seen in cross section, the lateral surface 57 forms an angle α (alpha) with a radial plane. The angle α is measured, in cross section, between the lateral surface 57 and a straight line perpendicular to the axis of rotation XX passing through the second sidewall 27, as is shown in FIG. 6. The angle α is between 0 degrees and 90 degrees'; para[0065], 'The angle α is between 10 degrees and 45 degrees, for example around 25 degrees, here').

Regarding claim 2, OTICO discloses the spiked closing wheel of claim 1, and further teaches the wheel further comprising:
an inner annular surface (31, Fig. 1-9 - see inner annular surface formed by heel 31; para[0052], 'the tyre 3 also comprises a heel 31. As seen in cross section, as shown in FIGS. 5 and 6, the heel 31 forms a protrusion from the sole 21 that is oriented radially towards the inside of the tyre 3');

wherein the outer surface forms a corresponding outer annular surface (23, 61, Fig. 1-9 - see how the outer surface 23 forms a corresponding outer annular surface 61; para[0050], 'a tread 23'; para[0058], 'The tread 23 bears an exterior surface 61').

Regarding claim 3, OTICO discloses the spiked closing wheel of claim 2, and further teaches wherein the inner annular surface defines an opening extending between the first side and the second side (Fig. 2 - see how the inner annular surface 31 defines an opening extending from the first side 51 to the second side 25).

Regarding claim 7, OTICO discloses the spiked closing wheel of claim 3, and further teaches the wheel further comprising a hub removably secured within the opening (2, 5, 7, Fig. 1-9 - see how the wheel further comprises a hub 2 with flanges 5/7 removably secured within the opening; para[0044], 'The assembly formed by the two flanges 5, 7 and the fasteners 9 can be seen as at least one part of a wheel body 2'; para[0045], 'The wheel body 2 has a through-opening centred on the axis of rotation XX. Those parts of the wheel body 2 that surround the opening form a hub of the wheel 1. This opening is shaped into an open housing that is able to accommodate the bearing assembly 11'; para[0052], 'The heel 31 is designed in a manner corresponding to the shape of the wheel body 2, and in particular in a manner corresponding to the shape of the peripheral rims of the flanges 5, 7. As can be seen in FIG. 6, when the flanges 5, 7 are mounted on one another, the peripheral rims of the flanges 5, 7 in the form of hooks grip the constriction 33 of the heel 31').

Regarding claim 8, OTICO discloses the spiked closing wheel of claim 7, and further teaches wherein the hub includes a second opening arranged and disposed for direct mounting to a frame (Fig. 1-9 - see how the hub 2/5/7 includes a central hub defining a second opening for receiving the bearing 11, said opening arranged and disposed for direct mounting a frame; para[0045], 'The wheel body 2 has a through-opening centred on the axis of rotation XX. Those parts of the wheel body 2 that surround the opening form a hub of the wheel 1. This opening is shaped into an open housing that is able to accommodate the bearing assembly 11'; para[0047], 'The bearing assembly 11 has a bore that is centred on the axis of rotation XX and opens onto each side of the wheel body 2. The bore in the bearing assembly 11 is designed to be slipped onto an axle of an agricultural machine').

Regarding claim 9, OTICO discloses the spiked closing wheel of claim 7, and further teaches wherein the hub comprises a first hub section reversibly secured to a second hub section (5, 7, Fig. 1-9 - see how the hub 2/5/7 comprises a first hub section 5 reversibly secured to a second hub section 7; para[0044], 'The assembly formed by the two flanges 5, 7 and the fasteners 9 can be seen as at least one part of a wheel body 2'; para[0045], 'The wheel body 2 has a through-opening centred on the axis of rotation XX. Those parts of the wheel body 2 that surround the opening form a hub of the wheel 1. This opening is shaped into an open housing that is able to accommodate the bearing assembly 11'; para[0052], 'The heel 31 is designed in a manner corresponding to the shape of the wheel body 2, and in particular in a manner corresponding to the shape of the peripheral rims of the flanges 5, 7. As can be seen in FIG. 6, when the flanges 5, 7 are mounted on one another, the peripheral rims of the flanges 5, 7 in the form of hooks grip the constriction 33 of the heel 31').

-*-Continued in next Supplemental Box--*

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 24/15929

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

-*-Supplemental Box - Box V.2 - Citations and Explanations-*-

Claims 1 and 14-15 lack novelty under PCT Article 33(2) as being anticipated by US 2018/0014454 A1 to YETTER MANUFACTURING COMPANY (hereinafter 'YETTER').

Regarding claim 1, YETTER discloses a spiked closing wheel (10, Fig. 1-9; para[0020], 'A seed furrow closing wheel 10') comprising: a body portion (12, Fig. 1-5; para[0020], 'closing wheel 10 includes a rim 12') having: a first side (Fig. 1-5 - see first side adjacent to hub plate 102); a second side (Fig. 1-5 - see second side adjacent to hub plate 104); and an outer surface extending between the first side and the second side (24, Fig. 1-5; para[0021], 'Rim 12 includes an outer, sloped roll perimeter 24'); and a plurality of teeth extending outwardly from the outer surface (14, Fig. 1-9; para[0020], 'Closing wheel 10 includes a rim 12 and a plurality of teeth 14 extending outward from rim 12 and circumferentially spaced apart from one another'); wherein at least one of the teeth extends from the outer surface at an angle with respect to a plane perpendicular to an axis of rotation of the wheel (Fig. 1-9 - see how the teeth 14 extend from the outer surface 24 at an angle with respect to a plane 32 perpendicular to the axis of rotation 106; para[0020], 'Each tooth 14 includes a multi-faceted face 16 (shown illustratively as a shaded region on tooth 14 in FIG. 2) extending from a proximal end 11 to a distal end 13 of tooth 14 and a crown 18 positioned at distal end 13 as suggested in FIG. 2'; para[0023], 'A rim plane 32 extends through rim 12 and is perpendicular to axis of rotation 106 as suggested in FIG. 4').

Regarding claim 14, YETTER discloses the spiked closing wheel of claim 1, and further teaches wherein each of the plurality of teeth is contoured (14, Fig. 1-9 - see how each of the teeth 14 are contoured with a plurality of faces 16 and crowns 18; para[0020], 'Each tooth 14 includes a multi-faceted face 16 (shown illustratively as a shaded region on tooth 14 in FIG. 2) extending from a proximal end 11 to a distal end 13 of tooth 14 and a crown 18 positioned at distal end 13 as suggested in FIG. 2'; para[0026], 'each tooth face 16 includes a pair of converging facets 42, 44 as suggested in FIGS. 2 and 7'; para[0027], 'Crown 18 includes a rounded edge 52 and a pair of beveled surfaces 54, 56 extending from rounded edge 52 as suggested in FIGS. 2 and 7').

Regarding claim 15, YETTER discloses the spiked closing wheel of claim 1, and further teaches wherein each of the plurality of teeth is rotated with respect to the plane (Fig. 1-9 - see how each of the teeth 14 are rotated with respect to the plane 32/34 such that the face planes 36 of the teeth are positioned at an angle; para[0025], 'In the illustrative embodiment, each tooth 14 of closing wheel 10 is arranged on rim 12 such that face plane 36 is angled with respect to centerline 34 and axis 106 as suggested in FIG. 6. Face plane 36 is arranged at an angle α with respect to centerline 34 and an angle β with respect to axis 106').

Claims 1-17 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used in industry.

SEARCH HISTORY

Application Number	PCT/US 24/15929
Search Conducted By	MAA
Search Approved By	SCL

US/IPC Classifications Searched	IPC (8) INV. A01C 5/06, A01C 5/00, A01B 29/04; ADD. A01B 35/28, A01B 49/06, A01B 21/08, A01B 35/16 (2024.01) CPC: INV. A01C 5/066, A01C 5/068, A01C 5/06, A01C 5/00, A01B 29/04; ADD. A01B 35/28, A01B 49/06, A01B 21/08, A01B 35/16
Date Conducted	02 May 2024 (02.05.2024)

Documentation Searched	IPC (8) A01C 5/06, A01C 5/00, A01B 35/28, A01B 49/06, A01C 5/10, A01B 21/08, A01B 29/04, A01B 35/16, A01B 43/00, A01C 13/00 (2024.01) CPC: A01C 5/066, A01C 5/068, A01C 5/06, A01C 5/00, A01B 35/28, A01B 49/06, A01C 5/10, A01B 21/08, A01B 29/04, A01B 35/16, A01B 43/00, A01C 13/00 (keyword limited; terms below)
Search Terms Used	Furrow trench paddle row seed closing wheel plurality radial circumferential teeth tooth spikes disc disk tire angled slanted offset contoured
Date Conducted	02 May 2024 (02.05.2024)

Electronic Database Searched	PatBase
Files Searched	Full-text: AU BE BR CA CH CN DE DK EP ES FI FR GB IN JP KR SE TH TW US WO Bibliographic: (European) AT BA BE BG CH CS CY CZ DD DK EE ES FI GE GR HR HU IE IS IT LT LU LV MC MD MT NL NO PL PT RO RS SE SI SK SM TR UA YU (Asia) EA GC HK ID IL IN KZ MN MY PH RU SG SU TH TJ TW UZ VN (North America) CA CR CU DO GT HN MX NI PA SV TT (South America) AR BR CL CO EC PE UY (Australasia) AU NZ (Africa) AP DZ EG KE MA MW OA ZA ZM ZW

SEARCH HISTORY

Date Conducted		02 May 2024 (02.05.2024)
Search Logic:		
#	Search query	Results
1	PA = (carlstar group)	18
2	INV = (mcmichen kevin)	1
3	INV = (chahar mitesh)	0
4	INV = (dahl david)	21
5	PN = (US2016128266)	1
6	CTB 5 OR CTF 5	34
7	PN = (US2018014454)	1
8	CTB 7 OR CTF 7	12
9	8 NOT (6)	10
10	PN = (US2419717)	1
11	CTB 10 OR CTF 10	12
12	11 NOT (8 OR 6)	12
13	PN = (US5896932)	1
14	CTB 13 OR CTF 13	101
15	14 NOT (11 OR 8 OR 6)	91
16	PN = (US2011155031)	1
17	CTB 16 OR CTF 16	35
18	17 NOT (14 OR 11 OR 8 OR 6)	19
19	PN = (US8291998)	1
20	CTB 19 OR CTF 19	37
21	20 NOT (17 OR 14 OR 11 OR 8 OR 6)	19
22	IC = (A01C5/06 OR A01C5/00 OR A01B35/28 OR A01B49/06 OR A01C5/10 OR A01B21/08 OR A01B29/04 OR A01B35/16 OR A01B43/00 OR A01C13/00)	45,798
23	CPC = (A01C5/066 OR A01C5/068 OR A01C5/06 OR A01C5/00 OR A01B35/28 OR A01B49/06 OR A01C5/10 OR A01B21/08 OR A01B29/04 OR A01B35/16 OR A01B43/00 OR A01C13/00)	11,539
24	22 OR 23	48,265
25	24 and FT = ((furrow% OR trench% OR paddle% OR row% OR seed%) near (closing% OR wheel%))	3,685
26	25 and FT = ((plurality% OR radial% OR circumferential%) near (teeth% OR tooth% OR spike%))	102
27	26 NOT (20 OR 17 OR 14 OR 11 OR 8 OR 6)	84
28	PN = (EP3850933)	1
29	CTB 28 OR CTF 28	10
30	29 NOT (26 OR 20 OR 17 OR 14 OR 11 OR 8 OR 6)	6
31	PN = (US2018317377)	1
32	CTB 31 OR CTF 31	22
33	32 NOT (29 OR 26 OR 20 OR 17 OR 14 OR 11 OR 8 OR 6)	14
34	24 and FT = ((spik* OR teeth*) near (wheel% OR disc% OR disk% OR tire%))	607
35	34 and FT = ((angle% OR slant* OR offset% OR contour*) near (teeth% OR tooth% OR spik*))	65

SEARCH HISTORY

36 35 NOT (32 OR 29 OR 26 OR 20 OR 17 OR 14 OR 11 OR 8 OR 6) 46
 37 PN = (US2012325133) 1
 38 CTB 37 OR CTF 37 27
 39 38 NOT (35 OR 32 OR 29 OR 26 OR 20 OR 17 OR 14 OR 11 OR 8 OR 6) 12
 40 PN = (US7757777) 1
 41 CTB 40 OR CTF 40 22
 42 41 NOT (38 OR 35 OR 32 OR 29 OR 26 OR 20 OR 17 OR 14 OR 11 OR 8 OR 6)
 8
 43 FT = ((furrow% OR trench% OR paddle% OR row% OR seed%) near (closing% OR wheel%)) 52,475
 44 43 and FT = ((plurality% OR radial% OR circumferential%) near (teeth% OR tooth% OR spike%)) 1,080
 45 44 and FT = ((spik* OR teeth*) near (wheel% OR disc% OR disk% OR tire%)) 535
 46 45 and FT = ((angle% OR slant* OR offset% OR contour*) near (teeth% OR tooth% OR spik*)) 116
 47 46 NOT (41 OR 38 OR 35 OR 32 OR 29 OR 26 OR 20 OR 17 OR 14 OR 11 OR 8 OR 6) 99
 48 PN = (US2019021207) 1
 49 CTB 48 OR CTF 48 28
 50 49 NOT (46 OR 41 OR 38 OR 35 OR 32 OR 29 OR 26 OR 20 OR 17 OR 14 OR 11 OR 8 OR 6) 14
 51 PN = (DE102008036201) 1
 52 CTB 51 OR CTF 51 5
 53 52 NOT (49 OR 46 OR 41 OR 38 OR 35 OR 32 OR 29 OR 26 OR 20 OR 17 OR 14 OR 11 OR 8 OR 6) 3
 54 PN = (US2018317377 OR US8291998 OR US2019021207 OR US2011155031 OR US7757777 OR US2018014454 OR US2012325133 OR US5896932 OR US2016128266 OR EP3850933 OR US2419717 OR DE102008036201) 12

Electronic Database Searched	Google
Files Searched	Google Patents (https://patents.google.com)
Date Conducted	02 May 2024 (02.05.2024)
Search Logic: Articles and methods for depositing seeds Spiked closing wheel Spiked furrow closing wheel Spiked furrow closing wheel for planting operations Spiked furrow closing wheel with reversibly attachable hub Spiked furrow closing wheel with angled teeth	

SEARCH HISTORY

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Electronic Database Searched	Google
Files Searched	Google Scholar (excluding patents)
Date Conducted	02 May 2024 (02.05.2024)
Search Logic: Articles and methods for depositing seeds Spiked closing wheel Spiked furrow closing wheel Spiked furrow closing wheel for planting operations Spiked furrow closing wheel with reversibly attachable hub Spiked furrow closing wheel with angled teeth	

Electronic Database Searched	Google
Files Searched	Google Web
Date Conducted	02 May 2024 (02.05.2024)
Search Logic: Articles and methods for depositing seeds Spiked closing wheel Spiked furrow closing wheel Spiked furrow closing wheel for planting operations Spiked furrow closing wheel with reversibly attachable hub Spiked furrow closing wheel with angled teeth	