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APPLICATION NUMBER: ***16/470,472***
FILING DATE: ***June 17, 2019***
PATENT NUMBER: ***11665989***
ISSUE DATE: ***June 06, 2023***

Certified by

Katherine Kelly Vidal

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Under Secretary of Commerce
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UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor (First): Benjamin Anson FANSHIER | Customer No.: 88988

Docket No.: US16/40/WO/US-2

Filed: June 17, 2019

Title: **IMPLEMENT CONTOURING TOOLBAR**

Commissioner For Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PRELIMINARY AMENDMENT

Dear Sir:

Prior to examining the above-identified application, please make the following amendments as shown in:

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks begin on Page 5 of this Paper.

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AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A system, comprising:

a frame member;

a toolbar coupled to the frame ~~member,~~ member via a hinged joint, the toolbar oriented parallel to, and rearward of, the frame member;

a row unit coupled to the toolbar;

a first sensor coupled to the toolbar, the first sensor configured to sense a position of the toolbar relative to ground; and

an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar relative to the frame member based on a sensed position of the toolbar.

2. (Canceled) ~~The system of claim 1, further comprising a first sensor coupled to the toolbar, the first sensor configured to sense a position of the toolbar relative to ground, the position of the toolbar corresponding to a position of the row unit relative to the ground.~~

3. (Currently Amended) The system of ~~claim 2,~~ claim 1, further comprising a second sensor coupled to the frame member, the second sensor configured to sense an angle of the toolbar relative to the frame member.

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4. (Original) The system of claim 3, further comprising a controller, the controller configured to receive first and second signals from the first and second sensors and cause actuation of the actuator based on the first and second signals.

5. (Original) The system of claim 4, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

6. (Original) The system of claim 5, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

7. (Original) The system of claim 4, wherein the controller is further configured to cause adjustment of a rate of rotation based on the first signals from the first sensor.

8. (Currently Amended) The system of ~~claim 2,~~ claim 1, further comprising a controller, the controller configured to receive a signal from the first sensor and cause actuation of the actuator based on the signal.

9. (Original) The system of claim 8, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

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10. (Original) The system of claim 9, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

11. (Original) The system of claim 8, wherein the controller is further configured to cause adjustment of a rate of rotation based on the signal from the first sensor.

12. (Original) The system of claim 1, wherein the sensed position is relative to a field surface, further comprising one or more electromagnetic sensors coupled to the frame member, the toolbar, or a combination of the frame member and the toolbar, the one or more electromagnetic sensors configured to sense an absolute elevation or change in elevation between the field surface and the toolbar or a combination of both the frame member and the toolbar.

13. (Original) The system of claim 12, further comprising a controller, the controller configured to receive one or more signals from the one or more electromagnetic sensors and cause actuation of the actuator based on the one or more signals.

14. (Original) The system of claim 13, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

15. (Original) The system of claim 14, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

16. (Original) The system of claim 13, wherein the controller is further configured to cause adjustment of a rate of rotation based on the one or more signals from the one or more electromagnetic sensors.

17. (Original) The system of claim 12, wherein the one or more electromagnetic sensors comprise ultrasonic, lidar, or radar sensors.

18. (Original) The system of claim 1, wherein the actuator is configured to rotate the toolbar throughout an obtuse angle range.

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19. (Currently Amended) A control system for an implement comprising a frame member and a toolbar coupled to the frame member rearward of and parallel to the frame ~~member,~~ member via a hinged joint, wherein secured to the toolbar are plural row units, the control system comprising:

a controller;

~~one or more sensors~~ at least one sensor configured to sense a position of the ~~toolbar;~~ toolbar relative to ground; and

an actuator coupled between the frame member and the toolbar, wherein the controller is configured to receive ~~a signal or signals~~ at least one signal from the at least one ~~or more sensors~~ sensor indicating the position of the toolbar relative to the ground and cause the actuator to rotate the toolbar based on the sensed position of the toolbar.

20. (Original) A computer-implemented method for an implement that comprises a toolbar that has row units secured thereto, the method for adjusting a rotation of the toolbar based on a contour of a field on which the implement traverses, the method comprising:

at a controller:

receiving an indication of a first angle change of the toolbar relative to ground;

causing an actuator that pivotably couples the toolbar to the frame member to retract based on the indication of the first angle change;

receiving an indication of a second angle change of the toolbar relative to the ground; and

causing the actuator to extend based on the indication of the second angle change.

21. (New) The system of claim 1, further comprising at least one wheel coupled to the frame member and at least partially supporting the frame member relative to the ground.

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REMARKS

Please enter the above claim amendments prior to examination of the application. By this paper, claims 1, 3, 8 and 19 are amended, Claim 2 is cancelled and claim 21 is added. Upon entry of this amendment, claims 1 and 3-21 will be pending. No new matter has been added as the amendments and new claim are fully supported by the specification and original claims as filed.

CONCLUSION

Applicant submits that the claims presented herein are patentably distinguishable from the prior art and prompt allowance of the application is respectfully requested. No additional fees are believed due but the Commissioner is hereby authorized to charge any additional fees which may be required, or to credit any overpayment to Deposit Account No. 010442.

Should the Examiner determine that anything else is desirable to place this application in an even better form for allowance, the Examiner is respectfully requested to contact the undersigned by telephone.

Respectfully submitted:

By: /Linda Blankenship/

Linda Blankenship
Reg. No.: 75,274
Phone: (620) 327-6993

SEND CORRESPONDENCE TO:
AGCO Corporation - Legal
420 W Lincoln Blvd
Hesston, KS 67062
June 17, 2019

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	2019-06-17
First Named Inventor	Benjamin Anson FANSHIER
Art Unit	
Examiner Name	
Attorney Docket Number	US16/40/WO/US-2

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5511623	A	1996-04-30	FRASIER, MICHAEL E	
	2	4825958	A	1989-05-02	KELDERMAN, Gary L.	
	3	6112827	A	2000-09-05	REIBER PHILLIP A	see WO ISR
	4	6076611	A	2000-06-20	ROZENDAAL et al	see GB SR

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	1	20020017090	A1	2002-02-14	HOCKENBECK, LEO SCHULZE	
	2	20140196996	A1	2014-07-17	ITO TATSUO et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	2019-06-17
	First Named Inventor	Benjamin Anson FANSHIER
	Art Unit	
	Examiner Name	
	Attorney Docket Number	US16/40/WO/US-2

	3	20110284252	A1	2011-11-24	FRIGGSTAD, et al.	see GB SR
	4	20150156955	A1	2015-06-11	SUDBRINK, et al.	see GB SR
	5	20140069670	A1	2014-03-13	FRIESEN, et al.	
	6	20120298388	A1	2012-11-29	BAUER, Mark A.	
	7	20020017389	A1	2002-02-14	MOSER et al	
	8	20150230391	A1	2015-08-20	HOUCK, SHANE	see WO ISR
	9	20080308020	A1	2008-12-18	RYDER et al;	see GB SR
	10	20110120357	A1	2011-05-26	SCHILLING et al;	see GB SR
	11	20110315410	A1	2011-12-29	KINZENBAW	see GB SR

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	Art Unit	
	Examiner Name	
	Attorney Docket Number	US16/40/WO/US-2

	1	1859670	EP	A1	2007-11-28	MAASLAND NV		☒
	2	2014/066654	WO	A1	2014-05-01	Precision Planting LLC	see WO ISR	☒
	3	2 524 587	EP	A1	2012-11-21	DEERE & CO	see WO ISR	☒
	4	2010201330	AU	A1	2011-03-24	AF GASON	see GB SR	☒
	5	2003/096785	WO	A1	2003-11-27	LEMPRIERE	see GB SR	☒

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	1	EUROPEAN PATENT OFFICE. International Search Report for International Application No. PCT/IB2017/001298, mail date 25 JAN 2018.	☒
	2	UK INTELLECTUAL PROPERTY OFFICE, Search report for related UK Application No. GB 1700585. I , dated 17 JULY 2017.	☒

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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	Application Number	
	Filing Date	2019-06-17
	First Named Inventor	Benjamin Anson FANSHIER
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	Examiner Name	
	Attorney Docket Number	US16/40/WO/US-2

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

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See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Linda Blankenship/	Date (YYYY-MM-DD)	2019-06-17
Name/Print	Linda Blankenship	Registration Number	75274

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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Your Reference: US16/40/GB
Application No: GB1700585.1

17 July 2017

Dear Sirs

Patents Act 1977: Search Report under Section 17(5)

I enclose a copy of my search report and a copy of the citations. Please note that published patent documents mentioned in my report may be obtained for free on the internet and are usually freely available from http://worldwide.espacenet.com.

Other search results

If you have applied to another patent office for a patent for this invention you will be receiving from them the results of their search. If you decide to proceed with the present application you are asked to provide a copy of any such official search report or details of any documents cited and category assigned in the report. You may file such information electronically using the online patent filing services detailed in https://www.gov.uk/government/publications/how-to-file-documents-with-the-intellectual-property-office.

Cut-off date This request applies to search reports that you have received before the date when you send a response to our first examination report under section 18(3) or section 18(4); if you make no response to an initial section 18(4) report the cut-off date is two months after the date of that report. Tell us about a search report sooner rather than later if that would allow it to be considered during our first examination.

Exceptions You do not have to supply details of a search report that (1) shows a nil response, or (2) has been published by WIPO or EPO, or (3) you have already supplied to us on a previous GB application.

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I estimate that, provided you have met all the formal requirements, preparations for publication of your application will be completed soon after **5 June 2018**. At this time you will receive a letter confirming the exact date of the completion of the preparations for publication. This letter will also tell you the publication number and date of publication of your application. However, it should NOT be relied upon as a reminder if you are intending to withdraw your application before publication, as it may not be issued in time for you to do so.

On the date of publication details of your application, including your name and address, will be entered in the Register of Patents and will become publicly available, including on our website. Some documents and correspondence from your application file will also be made publicly available on our website at http://www.ipo.gov.uk/p-ipsum.

Withdrawal

If you wish to withdraw your application to prevent publication you must withdraw it before the preparations for publication are complete. One way that you can withdraw your application is by emailing withdraw@ipo.gov.uk. Further details on withdrawal are available from https://www.gov.uk/patent-your-invention. **WARNING** – once preparations for publication are complete it will NOT be possible to prevent publication.

Amendment

If you wish to file amended claims for inclusion with the published application you must do so before the preparations for publication are completed.

Correspondence

If you write to the Office less than 3 weeks before 5 June 2018 please mark your letter prominently: **"URGENT - PUBLICATION IMMINENT"**.

Yours faithfully

Bryony Barceló

Bryony Barceló
Examiner

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AGCO - Exhibit No. 2005
IPR2024-001459
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Intellectual Property Office

Application No:	GB1700585.1	**Examiner:**	Bryony Barceló
Claims searched:	1-20	**Date of search:**	14 July 2017

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
A	-	US 6076611 A ROZENDAAL et al; see figure 1
A	-	US 2008/308020 A1 RYDER et al; see figure 8
A	-	AU 2010201330 A1 A F GASON; see figures 1 and 10
A	-	US 2011/120357 A1 SCHILLING et al; see figures 3 and 6
A	-	US 2011/315410 A4 KINZENBAW; see figures 14a and 15a
A	-	WO 03/096785 A1 LEMPRIERE; see figures 13 and 15
A	-	US 2011/284252 A1 FRIGGSTAD et al; see figures 1and 2
A	-	US 2015/156955 A1 SUDBRINK et al; see figure 2

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
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&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^{X} :

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Worldwide search of patent documents classified in the following areas of the IPC

A01B; A01C

The following online and other databases have been used in the preparation of this search report

WPI & EPODOC

International Classification:

Subclass	Subgroup	Valid From
A01B	0063/114	01/01/2006
A01B	0063/00	01/01/2006
A01B	0063/24	01/01/2006
A01B	0063/32	01/01/2006

(19) Europäisches Patentamt
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(11) EP 1 859 670 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
28.11.2007 Bulletin 2007/48

(51) Int Cl.:
A01D 78/10 *(2006.01)* ***A01B 63/32*** *(2006.01)*

(21) Application number: **07075368.6**

(22) Date of filing: **14.05.2007**

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Designated Extension States:
AL BA HR MK YU

(30) Priority: **22.05.2006 NL 1031852**

(71) Applicant: **Maasland N.V.**
3147 PA Maassluis (NL)

(72) Inventor: **van den Engel, Alfonsus Jacobus**
3123 CM Schiedam (NL)

(74) Representative: **Corten, Maurice Jean F.M. et al**
Octrooibureau Van der Lely N.V.
Weverskade 110
3147 PA Maassluis (NL)

(54) An agricultural machine

(57) An agricultural machine for crop processing, the agricultural machine being provided with a drawbar (1) that is connectable to a pulling vehicle, at least one crop processing member (2) that is pivotably fastened to the drawbar, and a hydraulic lift cylinder (3) for pivoting the crop processing member (2) upwards relative to the drawbar (1), one side of the lift cylinder (3) being fastened to the crop processing member (2) and its other side to the drawbar (1), the lift cylinder (3) comprising a first cylinder housing (6) connected to the crop processing member (2), a second cylinder housing (7) connected to the drawbar and a common piston rod (8) connecting the two cylinder housings (6, 7) and being slidably included therein, the active internal surface of the first cylinder housing (6) being larger than the active internal surface of the second cylinder housing (7).

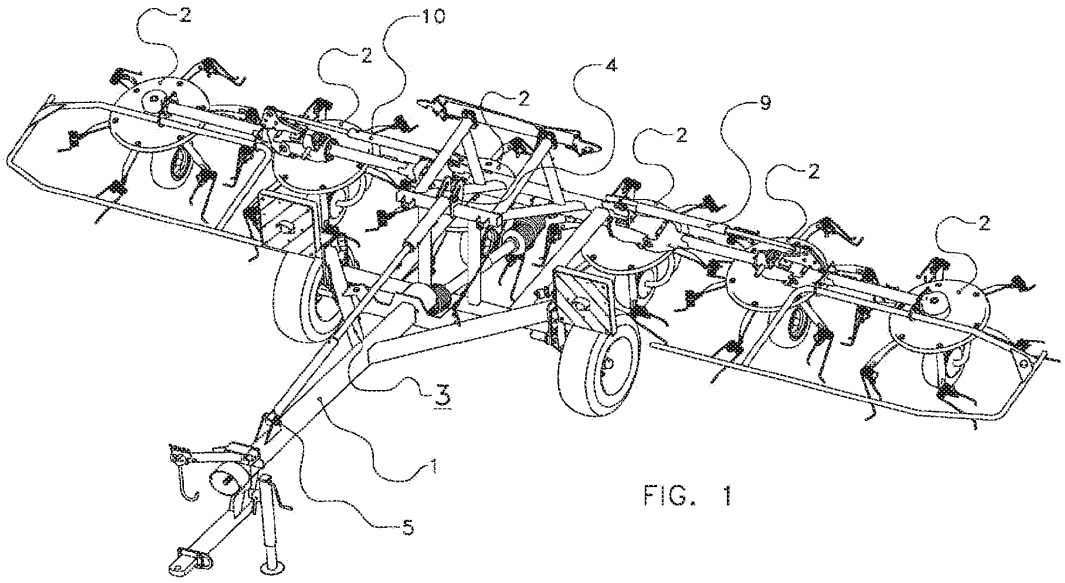


FIG. 1

EP 1 859 670 A1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The invention relates to an agricultural machine for crop processing according to the preamble of claim 1.

[0002] Such a machine is known from EP-A-0 844 814. Although this agricultural machine functions properly, there is a need for an agricultural machine which is capable of being brought in a relatively simple manner into a transport position, and which is also capable of being brought in a relatively simple manner into a headland position.

[0003] In order to satisfy this need, the present invention provides an agricultural machine comprising the features according to claim 1. This makes it possible to integrate a headland position into the pivoting movement to the transport position, in other words the headland position is integrated as a folding up step in the folding up sequence to the transport position, without an additional action or valve being required. By means of the claimed lift actuatorwith the cylinder housings having different active internal surfaces, a so-called pressure stage is achieved. By active internal surface is meant that surface that is in contact with the power transmitting fluid and that is perpendicular to the direction of movement of the piston. The driving force, equal to pressure times active internal surface, is then different for the two sides. Note that the lift actuator could also be a lift cylinder, that may have more than one cylinder housing. Advantageous embodiments are described in the dependent claims.

[0004] In particular, the first cylinder housing may be connected to the crop processing member, the second cylinder housing may be connected to the drawbar, and the piston rod may be a common piston rod of the first and the second piston. This is an expedient embodiment of cylinder housing - common rod - cylinder housing, that allows good guiding.

[0005] In all of the above embodiments, the pistons are moveable along parallel lines.

[0006] Alternatively, the first and second cylinder housing are fixedly integrated back-to-back, the first piston comprises a first piston rod that is connected to the crop processing member, and the second piston comprises a second piston rod that is connected to the drawbar. This allows maximum working space at the ends of the piston rods. Furthermore, in this embodiment the pistons could be moveable along parallel lines, but it is also possible to arrange the cylinder housings such that the pistons are moveable under an angle with respect to each other.

[0007] Of course, the hydraulic pressure in the first and the second cylinder housing should be substantially equal. Thereto, both cylinder housings may be connected to a hydraulic pump by means of two hydraulic connections in parallel. In another embodiment, the common piston rod is hollow and opens out into the first and the second cylinder housing, such as to equalize the hydraulic pressures in the first and the second cylinder housing. Now only one hydraulic connection to the hydraulic pump is needed. It is also possible to have only one connection to the hydraulic pump, and to have a further connection between the cylinder housings in the form of an additional conduit or the like.

[0008] In an embodiment, the first and second piston are of substantially equal surface area, the first piston is connected to a piston rod with a first cross-sectional area and the second piston is connected to a piston rod with a second cross-sectional area that is not equal to the first cross-sectional area. This allows to have substantially equal cylinder housings, which may thus be standardized. Alternatively, the surface area of the pistons differs.

[0009] The present invention is in particular advantageous when being applied to an agricultural machine provided with a number of motor driven crop processing members rotating about upward axes and arranged in a row extending transverse to the normal direction of travel of the machine, which number of crop processing members are pivotably connected with the drawbar via the lift cylinder. In this case one could also say that the crop processing member of the agricultural machine of the present invention is a crop processing assembly that comprises a frame with a plurality of crop processing members proper.

[0010] The first cylinder housing preferably serves for pivoting a crop processing member upwards into a headland position, and the second cylinder housing preferably serves for pivoting a crop processing member upwards from the headland position into a transport position. Just because, according to the invention, only one lift actuator is needed for adjusting the headland position and the transport position, it is possible, according to the invention, to produce a very economical agricultural machine.

[0011] The invention will be explained in further detail, by way of example, with reference to an exemplary embodiment.

Figure 1 is a schematic perspective front view of an agricultural machine according to the invention,
Figure 2 is a schematic side view of the machine shown in Figure 1, and
Figures 3a-c are schematic views of three embodiments of the hydraulic actuator of the machine shown in Figure 1 and 2.

[0012] Figure 1 shows in a schematic perspective view an agricultural machine for crop processing, in the embodiment shown a tedder. The tedder is provided with a drawbar 1 that is connectable to a (non-shown) pulling vehicle.

[0013] A number of (six in the embodiment shown) motor driven crop processing members 2 rotating about upward axes are arranged in a row extending transverse to the normal direction of travel of the tedder. In the embodiment shown, on either side of the drawbar 1 there are arranged three crop processing members 2. The row of crop processing members 2 is pivotably connected

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with the drawbar 1 via a hydraulic lift cylinder 3. The hydraulic lift cylinder 3 serves inter alia for pivoting the row of crop processing members 2 upwards relative to the drawbar 1, one side of the lift cylinder 3 being fastened in a first fastening point 4 to the row of crop processing members 2 and its other side being fastened in a second fastening point 5 to the drawbar 1.

[0014] According to the invention, as clearly visible in Figure 2, the lift cylinder 3 comprises a first cylinder housing 6 connected to the row of crop processing members 2, a second cylinder housing 7 connected to the drawbar 1 and a common piston rod 8 connecting the two cylinder housings 6, 7 and being slidably included therein. Not shown are supply lines for the hydraulic pressure. The piston rod 8 could be hollow (not shown).

[0015] In this case, the active internal surface of the first cylinder housing 6 is larger than the active internal surface of the second cylinder housing 7. If the diameter of the piston rod in the two cylinder housings is identical, this can be achieved in a simple manner by applying for the first cylinder housing 6 a greater internal diameter than for the second cylinder housing 7.

[0016] Owing to the fact that the diameter (i.e. the active surface) of the first cylinder housing 6 is greater than the diameter (i.e. the active surface) of the second cylinder housing 7, it is possible to achieve a sequence in folding up the tedder, so that a headland position can be included. In this case, the first cylinder housing 6 serves for pivoting the row of crop processing members 2 upwards into a headland position, and the second cylinder housing 7, that requires a higher pressure to be activated, serves for pivoting the row of crop processing members 2 upwards from the headland position into a transport position.

[0017] Between pivoting the number of crop processing members 2 arranged in a row into the headland position and pivoting them into the transport position, a preferred embodiment of the method according to the invention comprises the step of pivoting the crop processing members 2 disposed on either side of the drawbar 1 towards each other, the cylinders 9, 10 (Figure 1) serving for this purpose.

[0018] Figures 3a-c schematically show three embodiments a), b) and c) of the hydraulic actuator of the machine shown in Figure 1 and 2. Embodiment a) shows a first cylinder housing 6 and a second cylinder housing 7, with a first piston 11 and a second piston 12, respectively, connected by a common piston rod 8. The cylinder housings and pistons here being cylindrical, it can be seen that the active surface of the first cylinder housing 6 is smaller than that of the second cylinder housing 7.

[0019] Embodiment b) has first and second cylinder housings 6 and 7 and pistons 11 and 12 of equal area, but now the common rod has a cross-sectional surface area that is different in the first and second cylinder housings 6 and 7. Now, the active surface in the first cylinder housing 6 is larger than that in the second cylinder housing.

[0020] Embodiment c) shows an alternative arrangement, in which the first and second cylinder housings 6 and 7 are integrated back-to-back, with the pistons 12 and 13 now each connected to a separate piston rod 13, and 14, respectively, which in turn are connected to one of the drawbar and the crop processing member (or assembly).

Claims

1. An agricultural machine for crop processing, the agricultural machine being provided with a drawbar (1) that is connectable to a pulling vehicle, at least one crop processing member (2) that is pivotably fastened to the drawbar, and a hydraulic lift actuator (3) for pivoting the crop processing member (2) upwards relative to the drawbar (1), one side of the lift actuator (3) being fastened to the crop processing member (2) and its other side to the drawbar (1), wherein the lift actuator (3) comprises a first and a second cylinder housing (6, 7) and a first and a second piston and at least one piston rod, that are connected between the drawbar and the crop processing member, wherein the cylinder housings are arranged to be supplied with a substantially equal hydraulic pressure, and wherein the first piston is slideably included in the first cylinder housing and the second piston is slideably included in the second cylinder housing, an active internal surface of the first cylinder housing (6) being different from an active internal surface of the second cylinder housing (7).

2. An agricultural machine as claimed in clam 1, **characterized in that** the first cylinder housing is connected to the crop processing member, the second cylinder housing is connected to the drawbar, and the piston rod is a common piston rod of the first and the second piston.

3. An agricultural machine as claimed in claim 2, **characterized in that** the common piston rod is hollow and opens out into the first and the second cylinder housing, such as to equalize the hydraulic pressures in the first and the second cylinder housing.

4. An agricultural machine as claimed in claim 1, **characterized in that** the first and second cylinder housing are fixedly integrated back-to-back, that the first piston comprises a first piston rod that is connected to the crop processing member, and that the second piston comprises a second piston rod that is connected to the drawbar.

5. An agricultural machine as claimed in any preceding claim, **characterized in that** the first and second piston are of substantially equal surface area, that the first piston is connected to a piston rod with a

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first cross-sectional area and that the second piston is connected to a piston rod with a second cross-sectional area that is not equal to the first cross-sectional area.

6. An agricultural machine as claimed in any preceding claim, **characterized in that** the agricultural machine is provided with a number of motor driven crop processing members (2) rotating about upward axes and arranged in a row extending transverse to the normal direction of travel of the machine, which number of crop processing members (2) are pivotably connected with the drawbar (1) via the lift actuator (3).

7. An agricultural machine as claimed in any preceding claim, **characterized in that** the first cylinder housing (6) serves for pivoting a crop processing member (2) upwards into a headland position.

8. An agricultural machine as claimed in any preceding claim, **characterized in that** the second cylinder housing (7) serves for pivoting a crop processing member (2) upwards from the headland position into a transport position.

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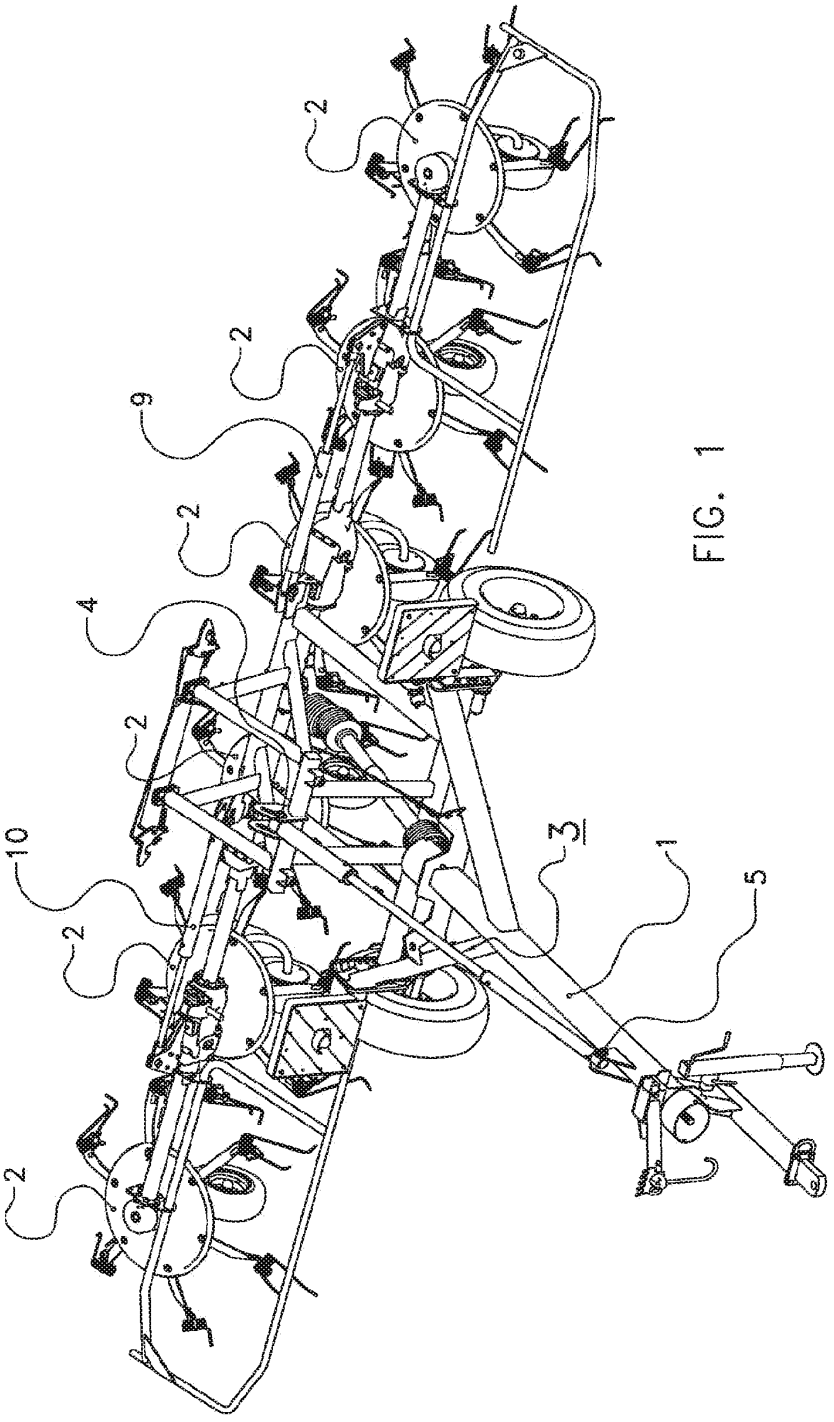


FIG. 1

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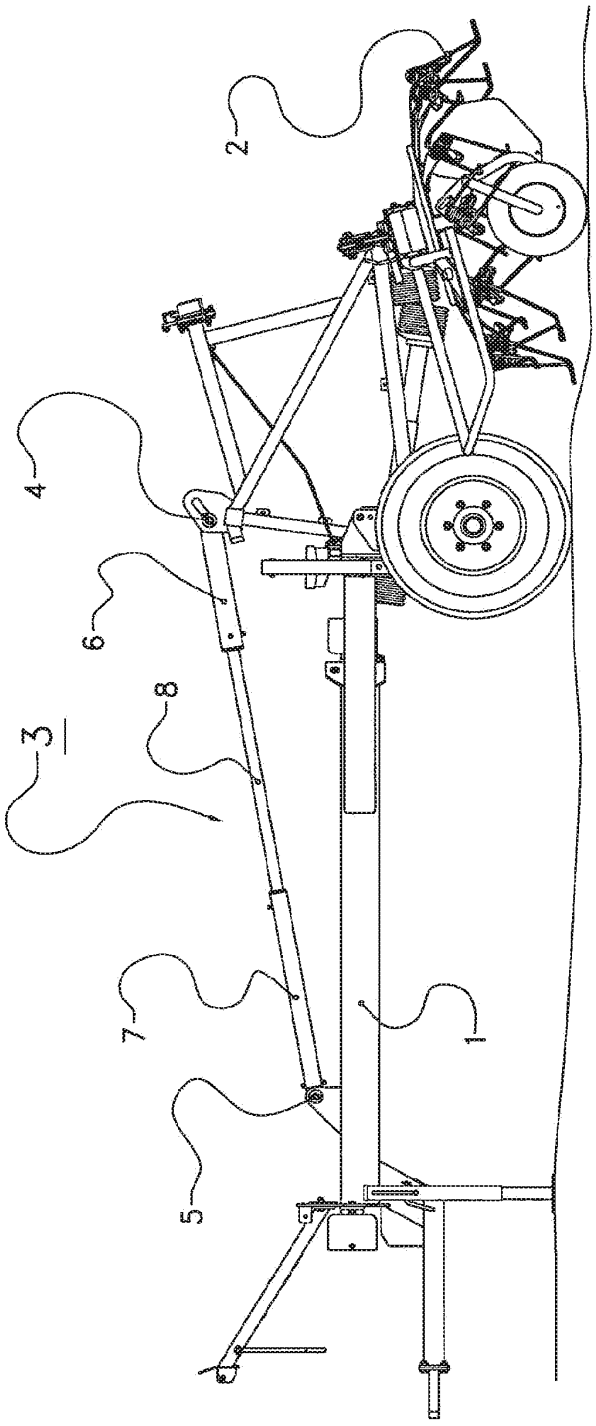


FIG. 2

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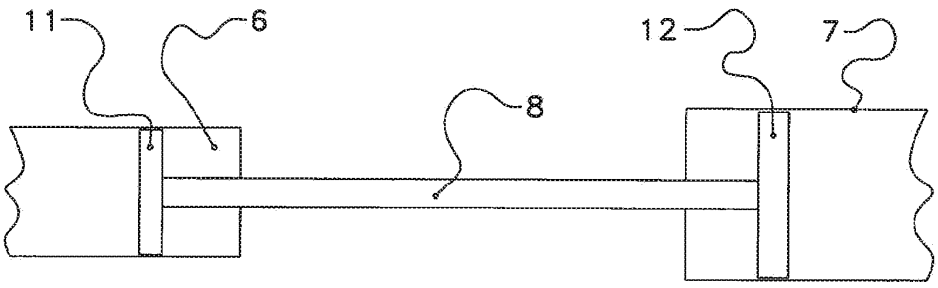


FIG. 3a

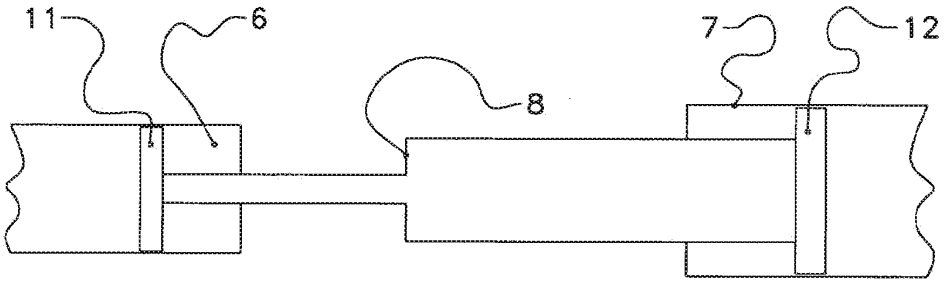


FIG. 3b

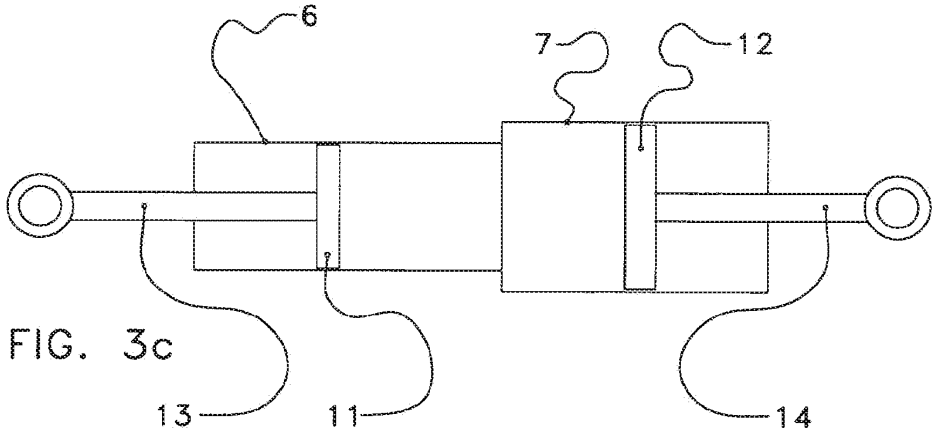


FIG. 3c

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European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 07 5368

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	29 June 2007	OLTRA GARCIA, R

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 07 07 5368

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(71) Applicant: **DEERE & COMPANY**
Moline, Illinois 61265-8098 (US)

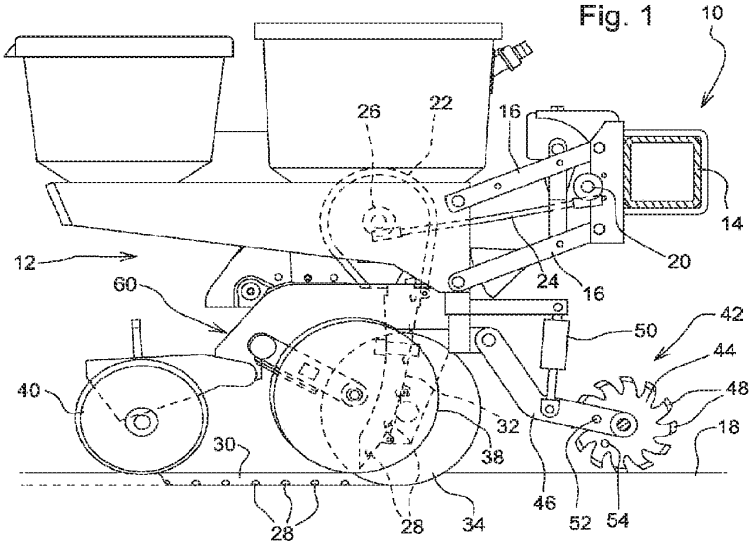
(72) Inventor: **Rylander, Dave J**
Victoria, Illinois 614859648 (US)

(74) Representative: **Reichert, Christian**
Deere & Company
European Office
Global Intellectual Property Services
John-Deere-Straße 70
68163 Mannheim (DE)

(54) Ground working machine and method for operating such

(57) A ground working machine (10) and a method for operating such ground working machine (10) is disclosed. The ground working machine (10) comprising: a frame (14); a ground engaging wheel mounted to the frame (14) and movable between a raised position not engaging the ground and a working position engaging the ground, the ground engaging wheel, when in the working position, rotating about a wheel axis as the machine is moved over the ground; an actuator (50) to move the ground engaging wheel between the raised and working positions. In order to improve planting efficiency it is proposed to provide a control system (70) including a sensor (52) to detect rotation of the ground engaging wheel, a controller receiving an input from the sensor (52), the controller operably connected to the actuator (50) to cause the actuator (50) to raise the ground engaging wheel when the sensor (52) detects that the ground engaging wheel is not rotating.

Fig. 1



EP 2 524 587 A1

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Description

[0001] A ground working machine is disclosed comprising a frame; a ground engaging wheel mounted to the frame and movable between a raised position not engaging the ground and a working position engaging the ground, the ground engaging wheel, when in the working position, rotating about a wheel axis as the machine is moved over the ground; an actuator to move the ground engaging wheel between the raised and working positions. Furthermore a method for operating said ground working machine is disclosed.

[0002] It is a common practice in Midwestern United States crop production to use minimum tillage or no-tillage practices that leave crop residue in the field. As a result, row cleaner wheels are commonly used planters. The row cleaner wheels clear previous crop residue and soil clods from the row unit's path to remove stubble and clear the ground. This provides a more uniform environment for placing seed in the soil and clears residue from the immediate area surrounding the seed to facilitate warming of the soil and reduce the likelihood of disease and fungi interference with the emerging seedling.

[0003] Most row cleaner wheels are configured to clear a path as wide as the row unit gauge wheels. Row cleaner wheels used in tilled soil struggle to find enough traction to keep the wheels turning. Floating row cleaner wheels are often used in combination with treader wheels to gauge depth and provide extra traction to keep the cleaner wheels turning. When planting in tilled cornstalks, root balls and stalks can easily become caught in front of the row cleaner wheels and stop rotation of the wheels. The row unit then starts to push a pile of residue and soil. It only takes a few seconds for the pile to become large enough to impact the rows on either side of the plugged row. The planter must be stopped and raised and moved over the pile to clear the pile. If the operator doesn't want to leave an unplanted gap in the field, the pile of residue and soil must be manually moved aside rather than raising the planter to move over the pile. This is time consuming and reduces the planting efficiency.

[0004] Accordingly, an object of this invention is to provide a ground working machine which overcomes the above mentioned problems.

[0005] The object will be achieved by the teaching of claims 1 and 10. Further advantageous embodiments are described within the accompanying claims.

[0006] Accordingly, a ground working machine of the above mentioned type is provided with a control system including a sensor to detect rotation of the ground engaging wheel, a controller receiving an input from the sensor, the controller operably connected to the actuator to cause the actuator to raise the ground engaging wheel when the sensor detects that the ground engaging wheel is not rotating.

[0007] A ground working machine is described having a frame, a ground engaging wheel mounted to the frame and movable between a raised position not engaging the ground and a working position engaging the ground. The ground engaging wheel, when in the working position, rotates about a wheel axis as the machine is moved over the ground. A control system is provided having a sensor to detect rotation of the ground engaging wheel, a controller receiving an input from the sensor, and an actuator to raise the ground engaging wheel when the sensor detects the ground engaging wheel is not rotating.

Fig. 1 is a side view of a ground working machine illustrating a row unit of the machine; and

Fig. 2 is a control system for raising a ground engaging wheel of the machine in response to the ground engaging wheel no longer rotating.

[0008] With reference to Fig. 1, one row unit 12 of a ground working machine 10 is shown. Ground working machine 10 is in the form of a seeding machine, and in particular, a row crop planter but could be any type of machine having at least one rotating wheel engaging and working the ground as the machine is moved over the ground. Machine 10 has a plurality of the individual row units 12 coupled with a transverse tool bar or frame 14. The tool bar 14 is in turn coupled to a tractor (not shown) for moving the machine in a known manner. Each row unit 12 is typically configured substantially identical to each other, and therefore, only a single row unit 12 is shown and described.

[0009] Row unit 12 is coupled with tool bar 14 through pivotal linkage elements 16, and thereby is movable in generally vertical up and down directions to follow the contour of soil 18. A planter drive includes a ground driven main shaft 20 that runs along the backside of tool bar 14 and is the source, or a primary source, of input power to each seed meter 22. A flexible drive shaft 24 couples the main shaft 20 to a transmission 26. The output of the transmission is a meter shaft of the seed meter 22. Seed meter 22 is used to space seeds 28 at an average predetermined distance from each other within seed trench 30. Seeds from the seed meter are deposited in the trench through seed tube 32.

[0010] The seed trench 30 is formed by a double disk opener 34. Gauge wheels 38 located to the sides and slightly rearward of the opening disks, control the depth to which the opener disks penetrate the soil, and thus the depth of the seed trench 30. Rearward of the gauge wheels are closing disks or wheels 40 that close the trench by placing soil on top of the seed. Forward of the opener 34 is a row cleaner 42 having a pair of cleaner wheels 44 arranged at an angle to the forward direction of travel of the machine. The cleaner wheels 44 are mounted to an arm 46 that is pivotally mounted to the row unit frame 60 at the forward end thereof. The wheels 44 as shown have a number of teeth or spikes 48 that engage the soil and rotate when the machine is moved over the soil. Each wheel 44 rotates about its own axis. The rotation of the wheels 44 causes crop residue on the

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soil surface to moved laterally, out of the path of the opener 34, leaving cleared soil for the opener. This facilitates accurate seed placement in the seed trench 30 and reduces the likelihood of "hairpining" where the opener pushes crop residue, such as a corn stalk, into the seed trench, creating an undesirable environment for seed. The position of the arm 46 is controlled by a linear actuator 50 that raises and lowers the arm 46 between a working position in which the wheels 44 engage the ground and a raised position in which the wheels do not engage. The actuator 50 can be a pneumatic cylinder, hydraulic cylinder, a motor actuated screw, etc. The exact form of the actuator is not critical. Some commercially available row cleaner products include the 2967 E-Series Residue Manager from Yetter Manufacturing Inc. of Colchester, Illinois, the Clean Sweep available from Precision Planting of Tremont, Illinois and the Ground Effects (Gfx) Floating Row Cleaner from Dawn Equipment Company of Sycamore, Illinois. Some row cleaners are "floating", meaning that the row cleaner is not fixed to the row unit frame but is free to follow the contours of the soil. Other row cleaners have a fixed position relative to the row unit frame controlled by the linear actuator 50.

[0011] In certain field conditions, crop residue, such as corn root balls and stalks, can easily become caught in the row cleaner wheels and stop rotation of the wheels. The row unit then starts to push a pile of residue and soil. It only takes a few seconds for the pile to become large enough to impact the rows on either side of the plugged row. To correct this problem, the machine must be stopped and raised and moved over the pile to clear the pile. If the operator doesn't want to leave an unplanted gap in the field, the pile of residue and soil must be manually moved aside rather than raising the planter to move over the pile. To reduce the disruption caused by a plugged row cleaner wheel, the wheels 44 are equipped with a wheel rotation sensor 52 on the arm 46. The sensor 52 may be a magnetic sensor with a magnet 54 mounted on the cleaner wheel 44 and detected by the sensor 52 when the magnet 54 passes the sensor. The sensor 52 produces an output signal communicated to a controller 56 shown in Fig. 2. Any of a variety of sensors can be used for detecting rotation of the cleaner wheels. These include inductive sensors, proximity sensors, optical sensors, hall effect sensors, etc. An optical sensor may be mounted remotely from the wheel. In addition, a video camera can be mounted to the frame in a location to visualize cleaner wheels on multiple row units and with analysis software determine which cleaner wheel is not turning for corrective action. When the rotation sensor detects a cleaner wheels not rotating, the control system 70 shown in Fig. 2 operates to raise the stopped cleaner wheel to allow the cleaner wheel to move over the accumulated pile of crop residue. The cleaner wheel is then returned to the operating position.

[0012] In the illustrated control system 70, the linear actuator is a hydraulic cylinder with hydraulic fluid pressure supplied from a tractor hydraulic supply 72. Hydraulic pressure in the system is controlled by a valve 74 through an electric input from the controller 56. A user input 76 to the controller allows the operator to set the system pressure. Individual control valves 78 operate to supply hydraulic fluid pressure to the linear actuators 50. Actuators 50 are single-acting, spring return hydraulic cylinders such that when the hydraulic pressure is removed from the cylinder, the spring return retracts the actuator piston, raising the arm 46 and row cleaner wheels 44. When one of the sensors 52 detects that the associated cleaner wheel is not rotating, the controller 56 will send a signal to the associated valve 78 to release the hydraulic pressure to the actuator 50 allowing the actuator to retract and raise the cleaner wheel. After a few seconds, the machine will have moved passed the residue pile, the controller then activates the valve 78 to reapply fluid pressure to lower the row cleaner once again. The sensor and control system operate autonomously without input from the operator to clear the cleaner wheel so that it again rotates.

[0013] Those skilled in the art will recognize that the control system 70 is only one of many possible ways to clear the residue from the cleaner wheel. The actuators 50 are also one possible type of actuator. A two-way cylinder can be used with a hydraulic system that operates to both raise and lower the cleaner wheel.

[0014] In the described system, each row unit cleaner wheels are operated independently. This provides the maximum benefit in terms of clearing the plug and not interrupting the operation of the other rows of the machine. But this also adds the most cost in terms of added valves in the control system. A less costly system uses one actuator to lift multiple cleaner wheels such as a gang of cleaner wheels. A still more simply system is one that raises the entire machine when one cleaner wheel stops rotating. While this effects the entire machine and still leaves a gap in the field when the machine is lifted, it still provides the benefit of automatic detection of a plugged cleaner wheels and correction and does not rely on the operator noticing the problem before taking corrective action.

[0015] While the system has been described in the context of clearing a plugged row cleaner wheel, it will be apparent to those skilled in the art that the system can be applied to any ground engaging wheel on the machine. The wheels of the row unit can be cleared by lifting the individual wheel or by lifting the entire row unit.

[0016] The control system 70 does not need to be operating at all times but only when the machine is at work in the field. For instance, when the machine is turned at the end of the field, the machine is first raised. Once raised, the cleaner wheels will be off the ground and thus not rotating. But there is no need at this point to detect the cleaner wheels not rotating. Thus an input into the control system of machine operation state is desirable. Various ways can be used to determine if the machine is in use. One way is to detect the position of the machine tool bar 14, is the tool bar raised for end row turning or

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transport, or is the tool bar lowered for in field operation. The tool bar position plus an machine speed input will enable a determination of machine use. If the tool bar is lowered, but not moving, there is no need to detect rotation of the cleaning wheels. Only when the tool bar is lowered and in motion is cleaner wheel rotation necessary. Motion of the machine can be determined by a separate machine speed sensor, by changes in a GPS location determination, or by tractor engine/transmission state, etc. Any of the above methods (and others) can be used to determine when it is necessary to monitor cleaner wheel rotation.

[0017] Having described the system, it will become apparent that various modifications can be made without departing from the scope as defined in the accompanying claims.

Claims

1. A ground working machine (10) comprising: a frame (14); a ground engaging wheel mounted to the frame (14) and movable between a raised position not engaging the ground and a working position engaging the ground, the ground engaging wheel, when in the working position, rotating about a wheel axis as the machine is moved over the ground; an actuator (50) to move the ground engaging wheel between the raised and working positions **characterized in** comprising a control system (70) including a sensor (52) to detect rotation of the ground engaging wheel, a controller receiving an input from the sensor (52), the controller operably connected to the actuator (50) to cause the actuator (50) to raise the ground engaging wheel when the sensor (52) detects that the ground engaging wheel is not rotating.

2. The ground working machine (10) of claim 1 further comprising means for determining when the machine (10) is in operation working the ground and only operating the control system (70) to raise the ground engaging wheel when the machine (10) is in operation and the sensor (52) detects the ground engaging wheel is not rotating.

3. The ground working machine (10) of claim 1 or 2 further comprising multiple ground engaging wheels and one or more sensors (52) to determine if any of said ground engaging wheels are not rotating, the control system (70) operable to raise all said ground engaging wheels together in response to one said ground engaging wheel not rotating.

4. The ground working machine (10) of claim 1 or 2 further comprising multiple ground engaging wheels and one or more sensors (52) to determine if any of said ground engaging wheels are not rotating, the control system operable to raise a portion of said ground engaging wheels together in response to one said ground engaging wheel not rotating.

5. The ground working machine (10) of claim 1 or 2 further comprising multiple ground engaging wheels and one or more sensors (52) to determine if any of said ground engaging wheels are not rotating, the control system operable to raise any one of said ground engaging wheels independently of other said ground engaging wheels in response to that ground engaging wheel not rotating.

6. The ground working machine (10) of one of the claims 1 to 5 wherein the machine (10) is a seeding machine having a plurality of row units (12), each row unit having said ground engaging wheel and said actuator (50) to raise the ground engaging wheel in response to the ground engaging wheel not rotating.

7. The ground working machine (10) of claim 6 wherein the ground engaging wheels are mounted to a respective one of the row units (12) and wherein the actuator (50) raises the entire row unit (12).

8. The ground working machine (10) of one of the claims 1 to 5 wherein the machine (10) is a seeding machine having a plurality of row units (12), each row (12) unit having a seed trench opener (34) and said ground engaging wheel in front of the seed trench opener (34) wherein the sensor (52) detects rotation of said ground engaging wheel and the actuator (50) lowers and raises said ground engaging wheel.

9. The ground working machine (10) of one of the claims 1 to 8 wherein said ground engaging wheel is a cleaner wheel (44).

10. A method of operating a ground working machine (10) having a ground engaging wheel movable between a raised position not engaging the ground and a working position engaging the ground, the ground engaging wheel rotating about a wheel axis when the machine (10) is moved over the ground, the method comprising the steps of: moving the machine (10) over the ground with the ground engaging wheel in the working position thereby causing the ground engaging wheel to rotate; detecting rotation of the ground engaging wheel; and in the event the ground engaging wheel stops rotating, move the ground engaging wheel to the raised position.

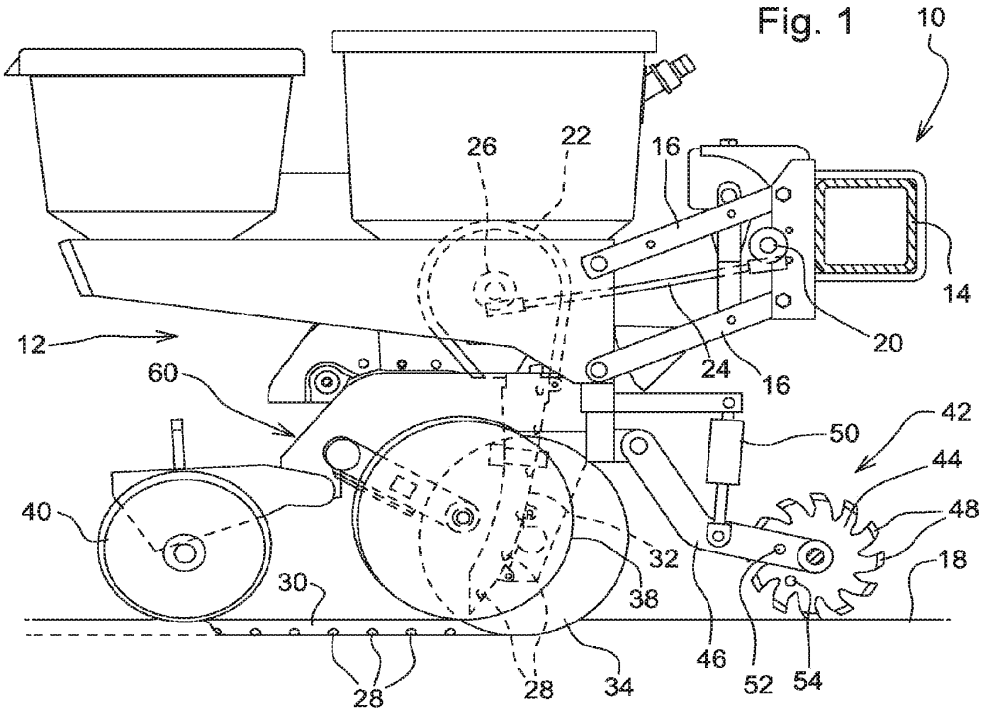
11. The method of operating a ground working machine (10) of claim 10 further comprising the step of after raising the ground engaging wheel, subsequently lowering the ground engaging wheel to the working position.

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12. The method of operating a ground working machine (10) of claim 10 or 11 wherein the ground engaging wheel comprising a cleaner wheel (44).

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Fig. 1



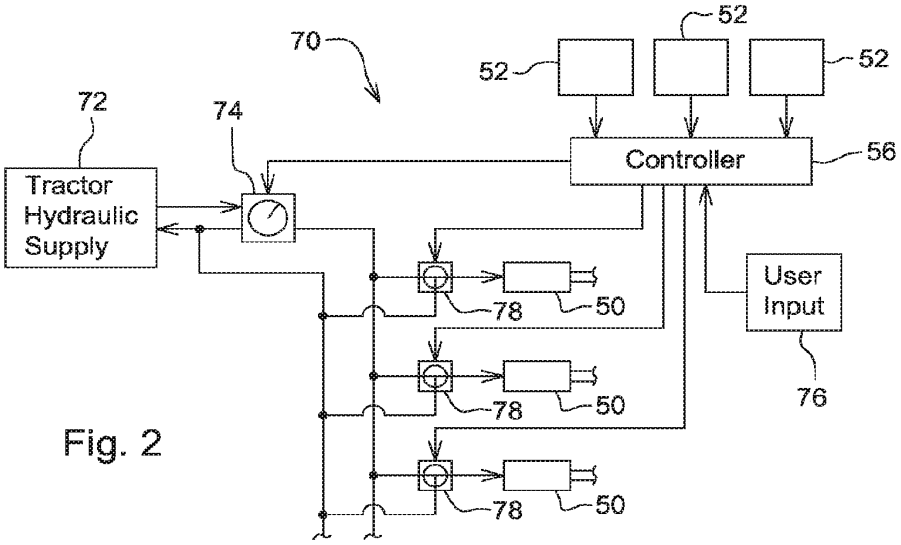


Fig. 2

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Europäisches Patentamt
European Patent Office
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EUROPEAN SEARCH REPORT

Application Number
EP 12 16 2071

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 5 704 430 A (SMITH DAVID R [US] ET AL) 6 January 1998 (1998-01-06) * figure 1 * * column 3, line 4 - column 7, line 18 *	1-12	INV. A01C5/06
A	US 6 273 637 B1 (PETERSON RANDELL D [US]) 14 August 2001 (2001-08-14) * figure 3 * * column 2, line 26 - column 3, line 67 *	1-7	
A	US 6 644 224 B1 (BASSETT JAMES H [US]) 11 November 2003 (2003-11-11) * figure 1 * * column 3, line 63 - column 6, line 51 *	1-12	
A	US 5 588 382 A (EMBREE GARY L [US] ET AL) 31 December 1996 (1996-12-31) * figure 1 * * column 2, line 44 - column 7, line 18 *	1-12	
A	US 5 346 020 A (BASSETT JAMES H [US]) 13 September 1994 (1994-09-13) * figure 1 * * column 3, line 49 - column 7, line 14 *	1-12	TECHNICAL FIELDS SEARCHED (IPC) A01B A01C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	24 September 2012	Bongibault, Patrick

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
O : non-written disclosure
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T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
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L : document cited for other reasons

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 12 16 2071

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

24-09-2012

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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(71) Applicant and
(72) Inventor: LEMPRIERE, Noel, D. [GB/CA]; P.O. Box 627, 4761 Gilbert Drive, Barriere, British Columbia V0E 1E0 (CA).

(74) Agent: EDWARDS, Antony, C.; Suite 800-1708 Dolphin Ave., Kelowna, British Columbia V1Y 9S4 (CA).

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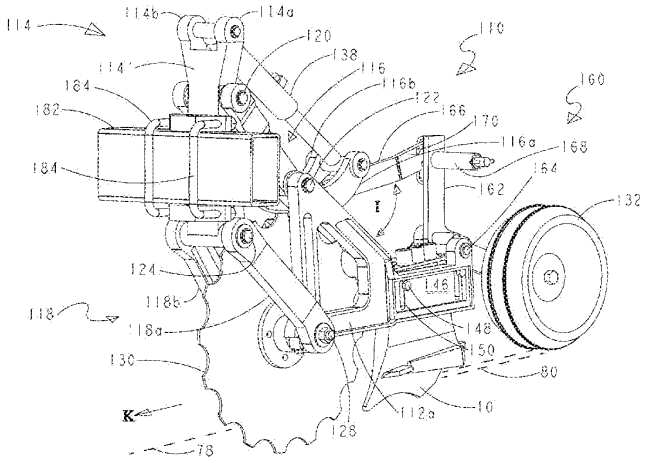
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Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European*

[Continued on next page]

(54) Title: IN-LINE SUB-SURFACE SEEDING, FERTILIZING AND WATERING SYSTEM



(57) Abstract: An in-line sub-surface seeding, fertilizing and watering system includes a blade (10) mountable into a header (112) of a parallelogram linkage (110). A pair of parallel rigid drag arms (116) extend between the header and a hanger assembly (114) and are pinned at their respective ends so that rotation of the header relative to the hanger assembly on the parallel arms maintains a general horizontal orientation of the header thereby supporting the blade downwardly in a constant orientation. The hanger assembly is mountable to a supporting frame (186). A selective actuator (138) allows selective control of a downward force urging the blade into the soil. An in-line coulter wheel (130) is mounted ahead of and in-line with the blade so as to be substantially co-planar therewith. The trailing edge of the coulter-wheel is adjacent to the leading edge of the blade.

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IN-LINE SUB-SURFACE SEEDING, FERTILIZING AND WATERING SYSTEM

Field of the Invention

This invention relates to the field of no-tillage opening blades which may be partially submerged into earth, for example in a farmers field, so as to pass the blade at a submerged depth for delivery of seeds, fertilizer or water into the earth, and to the mechanical system for actuating same.

Background of the Invention

This invention relates to blade delivery systems which have replaced tillage plows and the like. It is known that the use of plows or other devices having for example tillage discs for tilling the earth or otherwise opening and turning a furrow through the ground suffer from the disadvantage that the moisture in the soil is unnecessarily exposed to evaporation. In the past it was necessary to open the earth so that the ground beneath the surface could be seeded, fertilized and watered. Whether this was accomplished by machinery or done manually, prior art machines or manual systems also suffered from the disadvantage that fertilizer was typically delivered into close proximity to the seeds being sown occasionally resulting in the seeds becoming chemically burnt.

Thus there exists a need for, and it is an object of the present invention to provide, a blade and actuating system wherein the blade may be partially submerged into earth and translated therethrough, where the blade disturbs the earth minimally and without tillage and is adapted to deliver one or all of seeds, fertilizer or water from the blade in advantageous spaced apart relation as hereinafter described.

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Summary of the Invention

The sub-surface seeding, fertilizing and watering system of the present invention includes a mechanical actuating parallelogram linkage for actuating an opening blade. The blade has first and second sides extending between a leading edge and an aft edge. The first and second sides are advantageously generally symmetrical to each other on either side of a first plane, where the first plane generally bisects the opening blade, and the leading edge and the aft edge lie generally in the first plane.

The opening blade has an upper surface and a lower surface extending between upper and lower edges respectively of the first and second sides of the blade. First and second wings are mounted to the first and second sides respectively in generally oppositely disposed relation so as to be cantilevered outwardly therefrom. The first and second wings extend between first and second forward wing edges and first and second aft-opening wing apertures in the first and second wings respectively. The first and second wings are mounted to the first and second sides at, respectively, first and second distances from the lower surface measured generally parallel to the first plane. First and second canards may be mounted to the tip of the blade ahead of the wings, the canards similarly disposed so as to extend oppositely generally horizontally from the sides of the blade.

The opening blade has therethrough, and generally lying in the first plane, first and second conduits, extending from, and cooperating with, at uppermost ends thereof, first and second infeed ports in the upper surface. The first and second conduits cooperate with, at lowermost ends thereof, first and second wing ducts extending aft through the first and second wings respectively between the lowermost ends of the first and second conduits and the first and second aft opening wing apertures. The first and second conduits and the corresponding first and second wing ducts are thereby in material flow communication between the first and second infeed ports and the corresponding first and second aft opening wing apertures for seed, fertilizer or fluid flow, as fed from a material feeder, therethrough during the forward translation of the blade.

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The opening blade is mountable to the actuating linkage so as to be generally vertically disposed, when mounted thereon, for partial submerging into soil to a first submerged depth advancing the leading edge through the soil. The first and second distances are less than the first submerged depth so that the first and second wings are submerged in the soil during the forward translation of the blade.

In one preferred embodiment, the opening blade further includes a third conduit extending in material flow communication between a third infeed port in the upper surface and an aft opening blade aperture in a rearward position on the opening blade in proximity to the aft edge for seed, fertilizer or fluid flow therethrough, as fed from the material feeder. Advantageously, the aft-opening blade aperture is centrally disposed relative to the first plane so as to lie generally symmetrically across the first plane, and may be positioned so that the aperture intersects the lower surface of the blade. Thus the aft-opening blade aperture is formed at the intersection of the lower surface and the aft edge of the blade. The aft-opening blade aperture may lie in a second plane at generally 30° inclined relative to a third plane generally containing the lower surface of the blade, wherein the third plane is generally orthogonal to the first plane.

Advantageously, the first, second and third conduits are generally parallel and raked aft of their corresponding first, second and third infeed ports. The first, second and third conduits may be raked aft at an angle of approximately 55° relative to a fourth plane generally containing the upper surface of the blade if the upper surface is a planar generally horizontal surface, although this is not necessarily so.

In one embodiment, but not so as to be limiting, at least the first and second conduits are formed by mating of corresponding opposed facing channels in oppositely mounted side panels, oppositely mounted in, or mountable into, first and second sides of the blade.

In a further aspect of the design, the third conduit is generally parallel and adjacent the aft edge and the leading edge is concavely curved so as to substantially follow the

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curvature of an in-line coulter wheel mounted ahead of and adjacent the leading edge of the blade, the leading edge forming a pointed toe at the intersection of the leading edge and the lower surface of the blade a first distance from the coulter wheel. Advantageously, the pointed toe may be made of hardened material relative to the hardness of material forming the balance of the opening blade. The coulter wheel and leading edge form an opening at the toe of the blade which is sufficiently narrow to prevent large rocks or boulders becoming jammed therebetween.

In a further aspect, the opening blade may be defined as having a longitudinal length dimension and a height dimension, where the longitudinal length dimension is perpendicular to the height dimension and both dimensions lie in the first plane. Further, the opening blade has a lateral width dimension perpendicular to the first plane.

The longitudinal length dimension extends between the leading and aft edges of the blade, the height dimension extends between the upper and lower surfaces of the blade, and the lateral width dimension extends between the first and second sides of the blade. In the present design, the length dimension is much, that is, significantly greater than the width dimension, as described hereinafter. The height dimension in one embodiment is greater than the submerged depth so that the blade is supported above the soil and the blade thus partially submerged during forward translation, although this is not intended to be limiting. That is, it is readily conceivable to mount the blade to a support that itself becomes partially submerged in the soil.

Further advantageously, the first and second wings are wedge-shaped and the forward wing edges are vertices of the wedge-shaped wings.

The sides of the blade may be thought of as having upper and lower portions respectively above and below the wings. Thus, the first and second sides have upper portions generally located, respectively, between the first and second wings and the upper surface of the blade, and lower portions generally located between, respectively, the first and second wings and the lower surface of the blade. The lower portions collectively form a waisted or foot

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shape so that a forward width dimension of a forward flared portion of the lower portion of the opening blade and an aft width dimension of an aft flared portion of the lower portion of the opening blade, the forward and aft width dimensions extending between the lower portions of the first and second sides, are greater than an intermediate width dimension of a waisted portion longitudinally extending contiguously between the forward and aft flared portions.

The first wing may be defined as being set back a first longitudinal distance from the leading edge and the second wing as being set back a second longitudinal distance from the leading edge. Thus, in one aspect of this design, the first longitudinal distance may be greater than the second longitudinal distance. Correspondingly, the first wing mounted to the first side of the blade at a first longitudinal location generally corresponding to the aft flared portion of the blade, and the second wing may be mounted to the second side at a second longitudinal location generally corresponding to the waisted portion of the blade.

In the wing design, an upper wing surface on the first and second wings extends aft over the corresponding first and second aft-opening wing apertures on aft cantilevered upper wing members. The lower wing surface on the first and second wings may form a first wedge angle of approximately 5° with the upper wing surface. Further, laterally outer-most wing surfaces extend between the upper and lower wing surfaces. The laterally outer-most wing surfaces may advantageously intersect the corresponding first and second sides of the blade at their corresponding first and second forward wing edges. Thus the laterally outer-most wing surfaces may form a second wedge angle of approximately 5° relative to the first and second sides of the blade respectively. Advantageously, the first and second wings may themselves also be inclined downwardly so that a pair of corresponding planes bisecting the wedge angle between the upper and lower wing surfaces on each of the first and second wings, where the pair of corresponding planes contain the corresponding forward wing edges, are inclined forwardly and downwardly at approximately 5° relative to a generally horizontal plane containing the lower surface, it being taken for the sake of this defined relationship that the lower surface is generally planar and horizontal, although this is not intended to be limiting, and is not necessarily so, notwithstanding that the preferred embodiment hereinafter described is illustrated as such.

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The blade is mountable into a header of the parallelogram linkage. A pair of parallel rigid drag arms extend between the header and a hanger assembly and are pinned at their respective ends so that rotation of the header relative to the hanger assembly on the parallel arms maintains a general horizontal orientation of the header thereby supporting the blade downwardly in a constant orientation. The hanger assembly is mountable to a supporting frame. An array of such assemblies supporting an array of linkages, coulter wheels and blades may be mounted across the supporting frame. Selective actuation means such as a hydraulic actuator allows selective control of a downward force urging the blade into the soil. Where the selective actuation means is a hydraulic actuator mounted between the hanger assembly or frame and the parallel drag arms or header, the actuating linkage may be selectively elevated so as to remove the coulter wheel and blade from the soil.

The coulter wheel may be mounted to a forward end of the header, ahead of the leading edge of the blade. In a further alternative embodiment, a furrow closing means such as a closing wheel or plurality, such as canted pair, of closing wheels are mounted to a rear end of the header so as to trail rearwardly therefrom in line with a furrow created by the blade passing through the soil. The closing means may be urged downwardly by a selectively adjustable downward biasing means such as a pivotally mounted rocker arm pivotally mounted to a rear end of the header and selectively adjustable so as to be rotated downwardly to downwardly bias the furrow closing wheel.

Brief Description of the Drawings

Figure 1 is, in exploded perspective view, the inline, subsurface seeding, fertilizing and watering blade of the system of the present invention.

Figure 2 is a cross-sectional view along line 2-2 in Figure 1.

Figure 3 is, in left side elevation view, the device of Figure 1.

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Figure 3a is, in left side elevation view, an alternative embodiment of the blade of Figure 3.

Figure 3b is, in left side elevation view, a further alternative embodiment of the blade of Figure 3.

Figure 4 is, in bottom perspective view, the device of Figure 1.

Figure 5 is, in rear elevation view, the device of Figure 1.

Figure 6 is the view of Figure 5 as the blade is passed through soil.

Figure 7 is the rear elevation view of Figure 6 with the blade removed for clarity so as to illustrate an approximation of the soil mechanics during an initial seed placing and fertilizing phase.

Figure 8 follows on as a time-elapsed view of the view of Figure 7, illustrating the collapse of the soil and lateral translation of the seeds following the initial phase.

Figure 9 is, in a generally side perspective view, the actuating linkage of the in-line sub-surface seeding, fertilizing and watering system of the present invention, with the actuating linkage in a lowered position.

Figure 10 is, in a rear and lower perspective view, the actuating linkage of Figure 9.

Figure 11 is, in a rear and side perspective view, the actuating linkage of Figure 9.

Figure 12 is the linkage of Figure 9 showing the coulter wheel and blade lowered into the soil.

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Figure 13 is, in perspective view partially cut-away, a system of arrays of the actuating linkage, coulter wheel and blade of Figure 9 mounted in lateral arrays on a wheeled supporting frame.

Figure 14 is, in side elevation view, the system of Figure 13.

Figure 15 is the view of Figure 9, with the actuating linkage elevated to pass over a boulder.

Figure 16 is the lower perspective view of the device of Figure 9.

Figure 17 is the plan view of the device of Figure 9.

Figure 18 is the top perspective view of the device of Figure 9.

Detailed Description of Embodiments of the Invention

As may be seen by way of example in Figure 1, the no-tillage in-line sub-surface seeding, fertilizing and watering blade of the system of the present invention is depicted as opening blade 10. Opening blade 10 has an upper, ported, mounting block 12, or, in the embodiment of Figure 3b, mounting ears 12', rigidly mounted atop a generally planar blade structure 14. Blade structure 14 has a trunk 16 depending generally vertically beneath the upper ported mounting base or block 12 or ears 12'. Formed as part of the lower end of trunk 16 is a foot structure generally indicated by numeral 18.

As also seen in Figures 2-5, mounting block 12 and blade 14, including trunk 16 and foot 18, are elongate in a generally vertical first plane A. The first plane includes longitudinal axis A'. With the exception of wings 20 and 22 and canards 21, as better described below, the outer surface of trunk 16 smoothly merges into, so as to truncate in cross-section as, a waisted or foot-shaped lower surface 24. In one embodiment access panels 26 and 28, which conformally mount onto the lateral side walls of trunk 16, are symmetrically shaped relative to the plane of symmetry of trunk 16. The plane of symmetry of trunk 16 coincides with the first plane.

Upper ported mounting block 12 and mounting ears 12' have ports 30, 32 and 34 formed in their upper surfaces. The ports extend downwardly through block 12 in

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cooperative alignment with corresponding channels 36, 38 and 40 extending downwardly in generally parallel spaced apart array through trunk 16. Channel 40 also extends downwardly through foot 18.

Channels 36 and 38 may, in one preferred embodiment not intended to be limiting, be formed by the alignment and snug adjacency of flanges 42 and 44 on the inner sides of access panels 26 and 28 respectively when the access panels are mounted conformally in opposed relation, to the lateral sides of trunk 16 so as to cover cavity 46 in trunk 16. Access panel 26 may be mounted onto the port side of trunk 16 by means of tab 48 slidably engaging corresponding slot 50, formed in the lower surface defining cavity 46, so as to protrude downwardly into foot 18. In a similar fashion, tab 52 on access panel 28 also slidably engages slot 50 when mounting access panel 28 onto the starboard side of trunk 16. The upper ends of access panels 26 and 28 may be secured by releasable fasteners, for example a cooperating, flush-mounted nut and bolt pair (not shown) journalled through apertures 56.

With access panels 26 and 28 mounted onto trunk 16, so as to cooperatively align and abut flanges 42 and 44, thereby completing forming and separation of channels 36 and 38, channels 36 and 38 form a pair of chutes in cooperative alignment between ports 30 and 32 in mounting block 12 and corresponding lower outlet ports 58 and 60. Lower outlet ports 58 and 60 are directed laterally oppositely and open into the respective interior ducts 62 and 64 formed within respective wings 20 and 22. Interior ducts 62 and 64 open out into corresponding aft-facing apertures from under their respective wings 20 and 22 as better hereinafter described.

Toe 66, which may be of a different and hardened material relative to the material forming mounting block 12, trunk 16 and foot 18, is rigidly mounted, by bolting or other means known in the art, to the forward portion of foot 18 so as to form a forwardly extending point or snout 68, forwardly facing in the direction of forward translation B when the blade is translated in use. Advantageously, mounting block 12, trunk 16 and foot 18 may be made of austempered ductile iron (hereinafter ADI) and toe 66 may be made of a chrome alloy. Access panels 26 and 28 and wings 20 and 22 may also be made of ADI.

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Channel 40 is formed within and along the rear or aft edge of trunk 16 and foot 18 so as to form a continuous generally linear conduit between port 34 and rear aperture 70. Advantageously, the rear-most end of foot lower surface 24 is upturned for example as to provide aperture 70 with an opening generally perpendicular to the longitudinal axis of channel 40. Further advantageously, channels 36, 38 and 40 are generally parallel so as to be raked aft in a downward direction from ports 30, 32 and 34.

Wings 20 and 22 are each shaped as truncated wedges or otherwise as what may be described as irregular pyramid shapes wherein the vertex of each wedge or pyramid is aligned so as to be forward facing (in direction B) with the wedge diverging aft so as to form correspondingly shaped interior ducts 62 and 64 opening aft through the base of the wedges. In one preferred embodiment, the acute angles alpha (α)and beta (β), formed at the vertex of the wedges forming wings 20 and 22, are each approximately 5 degrees. In the preferred embodiment upper surfaces 20a and 22a, lateral surfaces 20b and 22b, and lower surfaces 20c and 22c of wings 20 and 22 respectively are each generally planar. In one embodiment such as seen in Figure 3a, upper surfaces 20a and 22a are inclined forwardly further downwardly relative to the plane containing foot lower surface 24. thus a plane H bisecting angle β would in this embodiment advantageously form an angle of approximately 5° relative to the plane F containing lower foot surface 24.

Upper surfaces 20a and 22a extend aft and are cantilevered outwardly over the aft apertures of interior ducts 62 and 64. The aft apertures of interior ducts 62 and 64 are advantageously formed by reducing the longitudinal length of lateral side walls 20b and 22b and raking the rearmost edge of lower surfaces 20c and 22c so as to extend them contiguously aft from the rear edge of lateral side walls 20b and 22b respectively to blend with foot 18.

In the preferred embodiment, foot 18 is curvaceously waisted along its longitudinal length so as to form between curved side walls a forward expanded lateral dimension 72 smoothly tapering into a reduced lateral dimension 74 corresponding to the waisting and, progressing aft, a gentle flaring to an aft expanded lateral dimension 76. In the

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preferred embodiment the waist of foot 18 approximately corresponds, in the longitudinal direction of axis A', to the position of the forward ends of wings 20 and 22. As seen in Figure 3b, the lower surface 24 may be concave or upwardly scalloped and the removable tip may include a pair of canards 21 disposed oppositely on either side of the tip. Mounting ears 12' may include horizontal flanges or ridges 12a' which allow the blade to be mounted slightly higher or lower relative to the coulter wheel described below.

In use, blade 16 is translated in direction B through soil 78. As seen in Figure 6, blade 16 is driven forwardly and positioned as better hereinafter described so as to maintain wings 20 and 22 submerged at a shallow depth below the surface of soil 78. Such motion opens the soil upwardly from point 68 on toe 66 upwardly along the leading edge of foot 18 and blade 16 causing a small lifting and separating of soil 78 in opposite directions C. As blade 16 translates through the soil, material fed into ports 30, 32 and 34 flows under the force of gravity through respective channels 36, 38 and 40. Material flowing through channel 40 exits through aperture 70 at the lowermost position of the narrow furrow 80 seen in Figure 7 formed in soil 78 by the passing of blade 14 therethrough. The passing of wings 20 and 22 through soil 78 form shelves 82 in the soil as the soil is displaced by the wings so as to form shoulders 84 approximated in the illustration of Figure 7.

The forward movement in direction B of blade 14 through soil 78 draws material such as fertilizer 86 from aperture 70, and also draws material such as seeds 88 from ducts 62 and 64 as the seeds are fed from channels 36 and 38 through outlet ports 58 and 60 respectively.

It has been found that the passing of wings 20 and 22, and in the embodiment of Figure 3b canards 21, and the passing of foot 18 in their form as described herein, causes a fluid-like circulation in direction D of soil 78 aft of wings 20 and 22. It is understood that the view of Figure 7 is an approximation of the cross-section through the soil immediately behind blade 14 as it is translating through the soil. The soil, acting in a fluid manner, collapses so as to drop down shoulders 84 as the soil beneath shelves 82 is circulated in counter-rotation in direction D. Applicant has found that this circulation transports seeds 88 laterally outwardly

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along shelves 82 so as to facilitate advantageous lateral spacing apart of seeds on either side of furrow 80 separated both laterally and vertically from fertilizer 86 so as to inhibit chemical burning of the seeds for example by reason of the spacial relationship approximated by the illustration of Figure 8.

It is understood that the order and type of materials introduced into ports 30, 32 and 34 may be changed as would be known to one skilled in the art so as to introduce, for example, seeds through ports 30 and 32 and water through port 34. A person skilled in the art would also understand that ports 30, 32 and 34 would have to be attached by appropriate conduits to corresponding hoppers or reservoirs carried, for example on a tractor (not shown) or trailer.

In the preferred embodiment, although not intended to be limiting, certain planes assist in defining the relationship of the elements of the present invention relative to one another as described above and claimed hereinbelow. Firstly, blade structure 14 is generally bisected by a first plane A, referred to above as coinciding with the plane of symmetry of trunk 16, which contains both the axis A' and the cross-sectional view reference line 2-2 seen in Figure 1. The cross-sectional view of Figure 2 is a view through a cutaway along first plane A. A second plane E is the plane containing the edges of aperture 70 at the lowermost end of channel 40. A third plane F is the plane containing foot lower surface 24. A fourth plane G is the plane containing the upper surface of mounting block 12. Lastly, a wing bisecting plane H bisects wing 20 by bisecting angle beta. A corresponding parallel wing bisecting plane bisects wing 22 by bisecting the corresponding angle on wing 22.

As seen in Figures 9 - 13, blade 10 is mounted to an actuating linkage 110 whereby the blade may be lowered into the soil 78 or elevated out of contact with soil 78.

Actuating linkage 110 is a parallelogram linkage for displacement in direction I of header assembly 112, specifically members 112a and 112b relative to hanger apparatus 114. The members are pivoted relative to hanger apparatus 114 on pivotally mounted upper drag arms 116 and lower drag arms 118. Each opposite end of the upper and lower drag arms are

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pivotally mounted by means of pins, bolts or the like. Thus upper drag arms 116 are mounted at one end to members 114a and 114b of hanger apparatus 114 by means of pin 120. The opposite end of upper drag arms 116, which include parallel arms 116a and 116b, are mounted between the upper ends of side plates 112a and 112b by means of pin 122.

Lower drag arms 118 include an opposed pair of parallel rigid arms 118a and 118b each pinned at the corresponding lower ends of hanger members 114a and 114b by means of a pin 124. As better seen in Figure 11, arms 118a and 118b of lower drag arm 118 are coupled to each other by collar 126 as seen in Figure 10. The opposite end of lower drag arms 118 are pivotally mounted to header members 112 by means of shaft 128.

Coulter wheel 130 is rotatably mounted on shaft 128, so as to sandwich the lower forward corners of header members 112a and 112b by means of a pair of mounting plates 133.

Consequently, the coulter wheel is not free to swivel relative to blade 10, but rather is held aligned, generally co-planar, with the blade.

The parallelogram linkage of upper drag arms 116 and lower drag arms 118 and header members 112 are actuated so as to rotate in direction I about hanger apparatus 114 by, in one embodiment, selective actuation of hydraulic ram 138. Hydraulic ram 138 is fed by high pressure hydraulic lines (not shown) as would be known by one skilled in the art. The upper end of hydraulic ram 138 is rigidly mounted to hanger apparatus 114, specifically, between the upper ends of hanger members 114a and 114b. The lower end of hydraulic ram 138 is pivotally between upturned lower ends of upper drag arms 116 by means of pinned coupling 144. Extension of hydraulic ram 138 causes rotation of the upper and lower drag arms downwardly, about pins 120 and 124, relative to hanger apparatus 114. Retracting so as to shorten hydraulic ram 138 rotates the upper and lower drag arms upwardly. Thus with blade 10 mounted by means of mounting block 12 or mounting ears 12' between the lower rear ends of header members 112a and 112b, the lower end of blade 10 may be selectively depressed below the surface of soil 78 so that blade 10 follows inline with the ground breaking

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engagement of coulter wheel 130 with the soil. In the embodiment of Figures 9-15 employing the blade of Figure 3b, flanges 12a' interlock with corrugations, grooves or channels 146a on the interior surfaces of the side plates 146 of the header assembly 112. Side plates 146 are clamped together so as to sandwich flanges 12a' and the upper end of blade 10 by means of bolts 148. Bolts 148 extend through elongate apertures 150 in side plates 146 and bolt holes 152 in the upper end of blade 10. Apertures 150 are vertically elongate so that the vertical position of blade 10 relative to side plates 146 may be adjusted, for example to compensate for erosive wear of coulter wheel 130.

As blade 10 is dragged in direction B through soil 78 a furrow 80 is created as described above. In one embodiment of the present system, a closure assembly 160 is mounted between header members 112a and 112b. L-shaped arm 162 has its elbow pivotally mounted on pin 164 at the upper rear end of side plates 146, between members 112a and 112b. A closing wheel 132, or pair or plurality of such wheels are rotatably mounted to the lower rearward end of arm 162 so as to press down into engagement with the upper surface of furrow 80 formed behind blade 10 as blade 10 passes through soil 78. Downwards pressure is applied to wheel 132 by the force of actuator 138 and/or the weight of linkage assembly 110 and blade 10. Arm 162 is maintained in its angular position about pin 164 by means of arm 166, better seen in Figure 11, mounted to header member 112b.

Arms 162 and 166 may be releasably pinned together by a manually releasable pin 168. Pin 168 may be removed to allow angular adjustment between arms 162 and 166, pin 168 being selectively insertable into an array of holes 170 along the rear end of arm 166. Selectively positioning the upper end of arm 162 outwardly along arm 166 rotates wheel 132 downwardly relative to header assembly 112 about pinned shaft 164 so as to selectively and adjustably apply a downward pressure against the upper surface of furrow 80.

As better seen in Figure 12, each of hanger members 114a and 114b making up hanger apparatus 114 may in fact each be parallel lobes of a rigid yoke in the upper end of a single rigid member 114' by u-shaped brackets 184.

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In one preferred embodiment, such as seen in Figure 13, bar 182 extends laterally across a supporting frame structure 186 so that a laterally spaced apart array of actuating linkages 110 may be mounted across one or more spaced apart bars 182. The supporting frame structure 186 supporting bars 182 is preferably mounted on wheels 188 so that the entire structure may be towed by a tow coupling 190 or otherwise mounted to a tractor (not shown) or the like thereby simultaneously pulling a laterally spaced apart array of blades 10 through soil 78.

Thus as also seen in Figure 14, the supporting frame structure 186 may also be used to support hoppers 192 on supporting legs 194. Hoppers 192 supply granular material such as seed or fertilizer to metering devices 196 mounted beneath the hoppers so as to feed, via conduits 198 such granular material into blade apertures 30, 32 and 34 forming the infeed inlets into blades 10. In Figure 13, conduits 198 are omitted, with the exception of those extending from the metering devices 196 most closely in the foreground in order to maintain a clear view of the arrays of linkages 110 mounted to the parallel laterally extending bars 182. As may be seen, a work platform 200 and an associated ladder may also be mounted to legs 194 so as to provide ease of access to for example hoppers 192.

One advantage of the inline arrangement of coulter wheels 130 and corresponding blades 10 is also illustrated in Figures 13 and 14. In particular, the leading edge of blades 10 are, as also seen in Figures 15 and 16, mounted adjacent to the outer circumference of the coulter wheel. As used herein, the term adjacent in describing the spatial relationship between coulter wheel 130 and blade 10 means that the distance d_1 between the outer circumference of coulter wheel 130 and the point of the toe on the leading edge of blade 10 is sufficiently narrow so that large rocks or boulders will not become jammed therebetween. With coulter wheel 130 mounted so as to rigidly maintain its inline alignment with blade 10, rather than a large rock or boulder impacting the leading edge of blade 10, the coulter wheel impacts the boulder such as the illustrated boulder 202 and rides up and over the boulder in direction J as the coulter wheel rotates in engagement with the ground. Because both coulter wheel 130 and blade 10 are mounted to header assembly 112, as coulter wheel rides up and over boulder 202 in direction J, the entire linkage 110 pivots upwardly, and because of the

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parallelogram formed by the upper and lower drag arms, blade 10 is not only elevated simultaneously with coulter wheel 130 but maintains its angular orientation relative to the ground as the entire frame structure 186 is translated forwardly in direction K on wheels 188. Thus as frame structure 186 is translated across a field, at any one time one or more of the coulter wheels 130 may encounter large rocks or boulders. This will not impede the progress of the frame structure and its associated arrays of coulter wheels and blades as only those coulter wheels and blades which encounter obstacles such as large rocks or boulders or the like will ride up over the obstacles and once pass the obstacles will once again lower into position at the optimal depth for seeding and fertilizing. Consequently it may be seen the advantage of having laterally extending arrays of linkages 110, one for each set of inline coulter wheels and blades. The use of two tiers of laterally extending arrays of linkages 110 allows for increased seeding density laterally across the width of the supporting frame, that is, an increased number of seeding rows or furrows formed across the width of the frame structure notwithstanding the physical width requirements of each linkage 110 and their associated coulter wheels, blades, closing wheels and feed conduits.

As will be apparent to those skilled in the art in the light of the foregoing disclosure, many alterations and modifications are possible in the practice of this invention without departing from the spirit or scope thereof. Accordingly, the scope of the invention is to be construed in accordance with the substance defined by the following claims.

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WHAT IS CLAIMED IS:

1. An in-line sub-surface seeding, fertilizing and watering device comprising an in-line blade mountable into a header means parallelogram linkage so as to be vertically downwardly disposed generally in a plane containing said linkage, said blade having internal conduits for transporting seed, fertilizer or water from an upper infeed to openings at a lower end of said blade, said parallelogram linkage comprising a pair of parallel rigid drag arms extending between said header means and a hanger means, said arms pinned at their respective ends to said header means and said hanger means so that rotation of said header means relative to said hanger means on said parallel arms maintains a generally horizontal orientation of said header means thereby supporting said blade, when mounted in said header means, downwardly in a constant orientation, wherein said hanger means is mountable to a supporting frame, said device further comprising selective actuation means for selective control of a downward force urging said blade, when mounted on said header means, downwardly into soil, a coulter wheel mounted to said linkage forward of, so as to be adjacent to said blade for simultaneous elevation and lowering of said wheel and said blade on said linkage, said wheel and said blade generally co-planar.

2. The device of claim 1 wherein said selective actuation means is a hydraulic actuator mounted between said hanger means and said drag arms, whereby said wheel and said blade may also be selectively elevated so as to remove said wheel and said blade from the soil.

3. The device of claim 1 wherein said selective actuation means is a hydraulic actuator mounted between said frame and said header means, whereby said wheel and said blade may also be selectively elevated so as to remove said wheel and said blade from the soil.

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4. The device of claim 1 wherein said selective actuation means is a hydraulic actuator mounted between said hanger means and said header means, whereby said wheel and said blade may also be selectively elevated so as to remove said wheel and said blade from the soil.

5. The device of claim 1 wherein said selective actuation means is a hydraulic actuator mounted between said frame and said drag arms, whereby said blade may also be selectively elevated so as to remove said blade from the soil.

6. The device of claim 1 wherein said wheel and said blade are co-planar in a vertical plane.

7. The device of claim 1 further comprising a furrow closing means mounted to a rear end of said header means so as to trail rearwardly therefrom in line with a furrow created by said wheel and said blade passing through the soil.

8. The device of claim 7 wherein said closing means is a closing wheel urged downwardly by a selectively adjustable downward biasing means mounted to a rear end of the header means.

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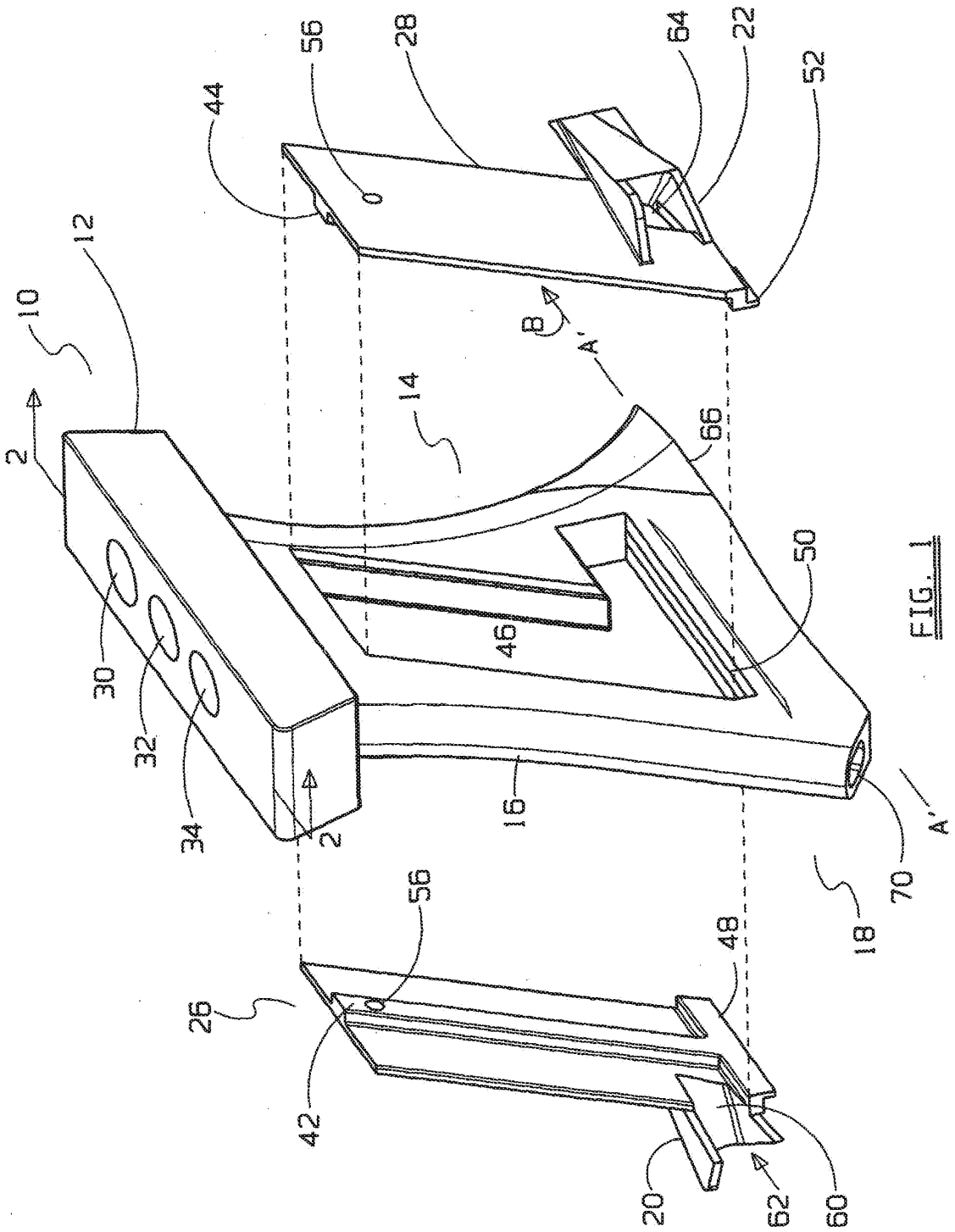


FIG. 1

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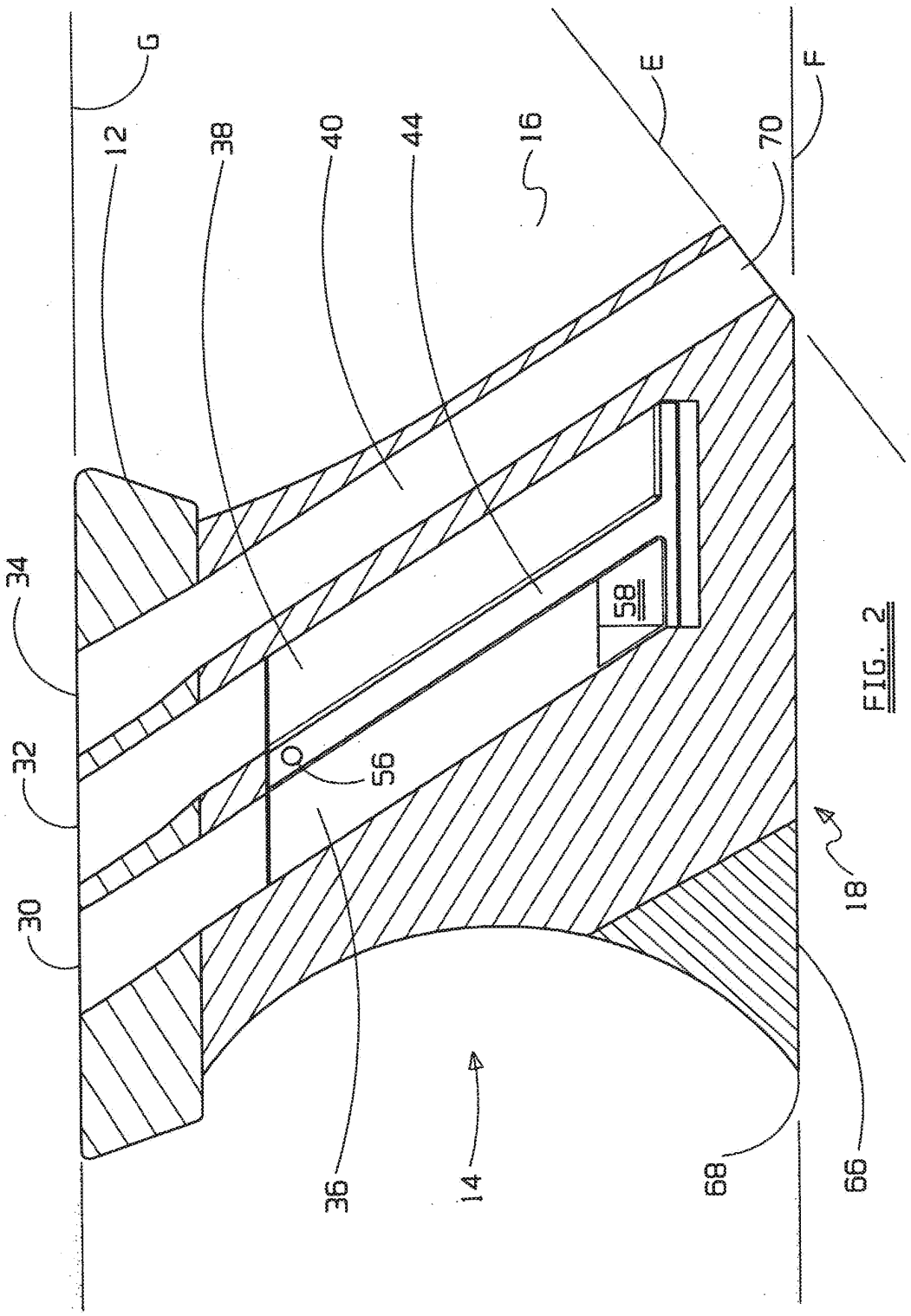


FIG. 2

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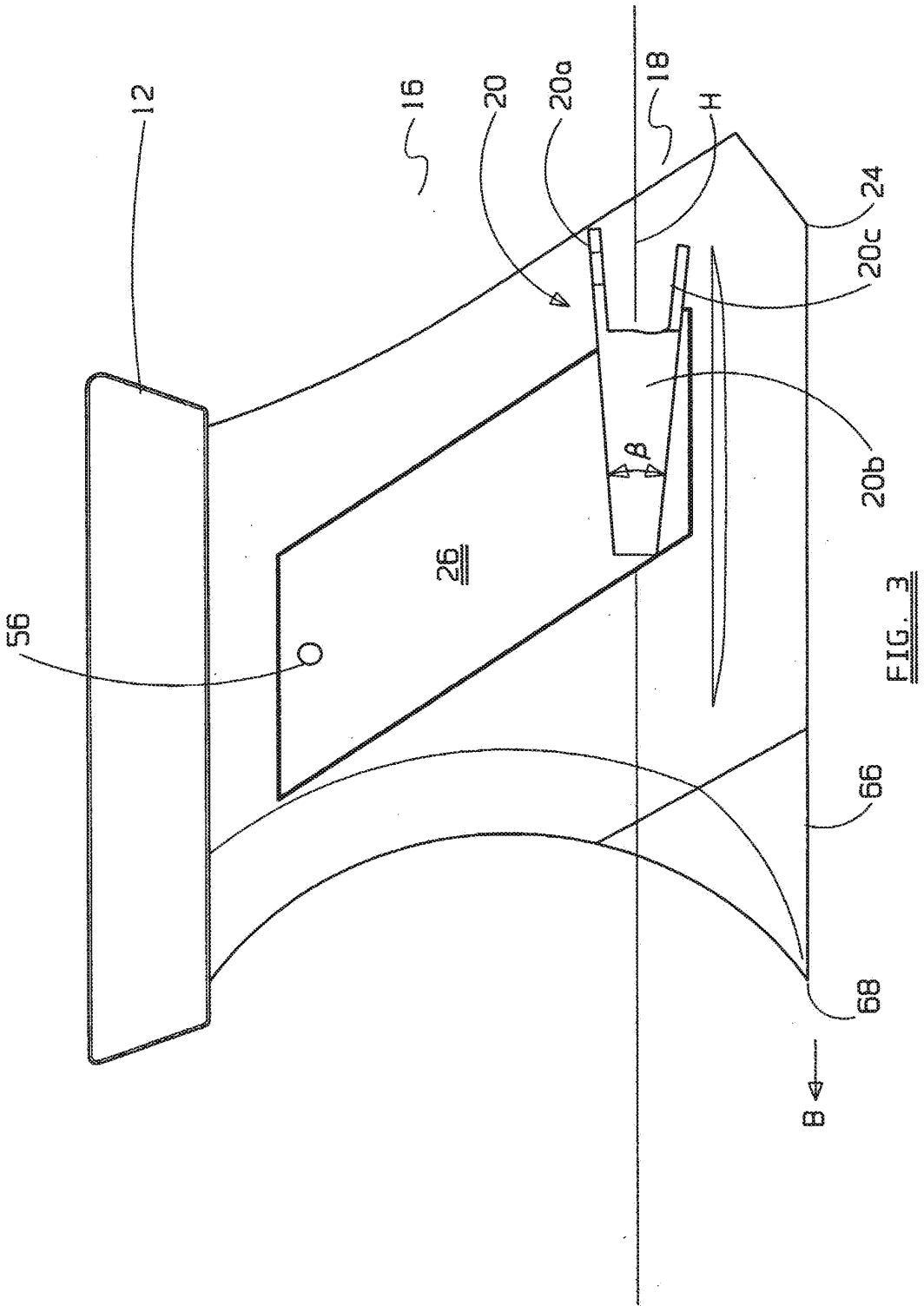


FIG. 3

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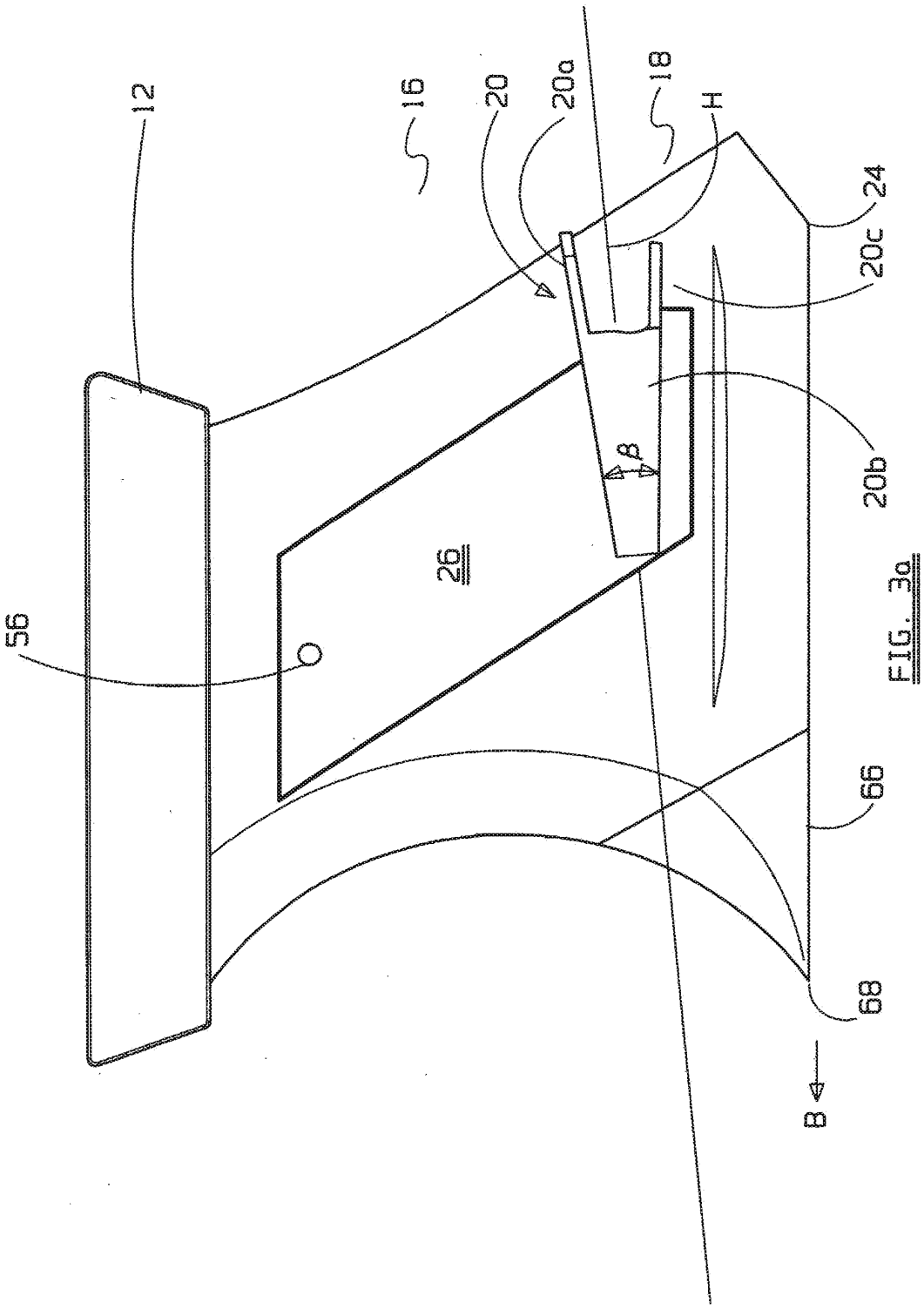


FIG. 3a

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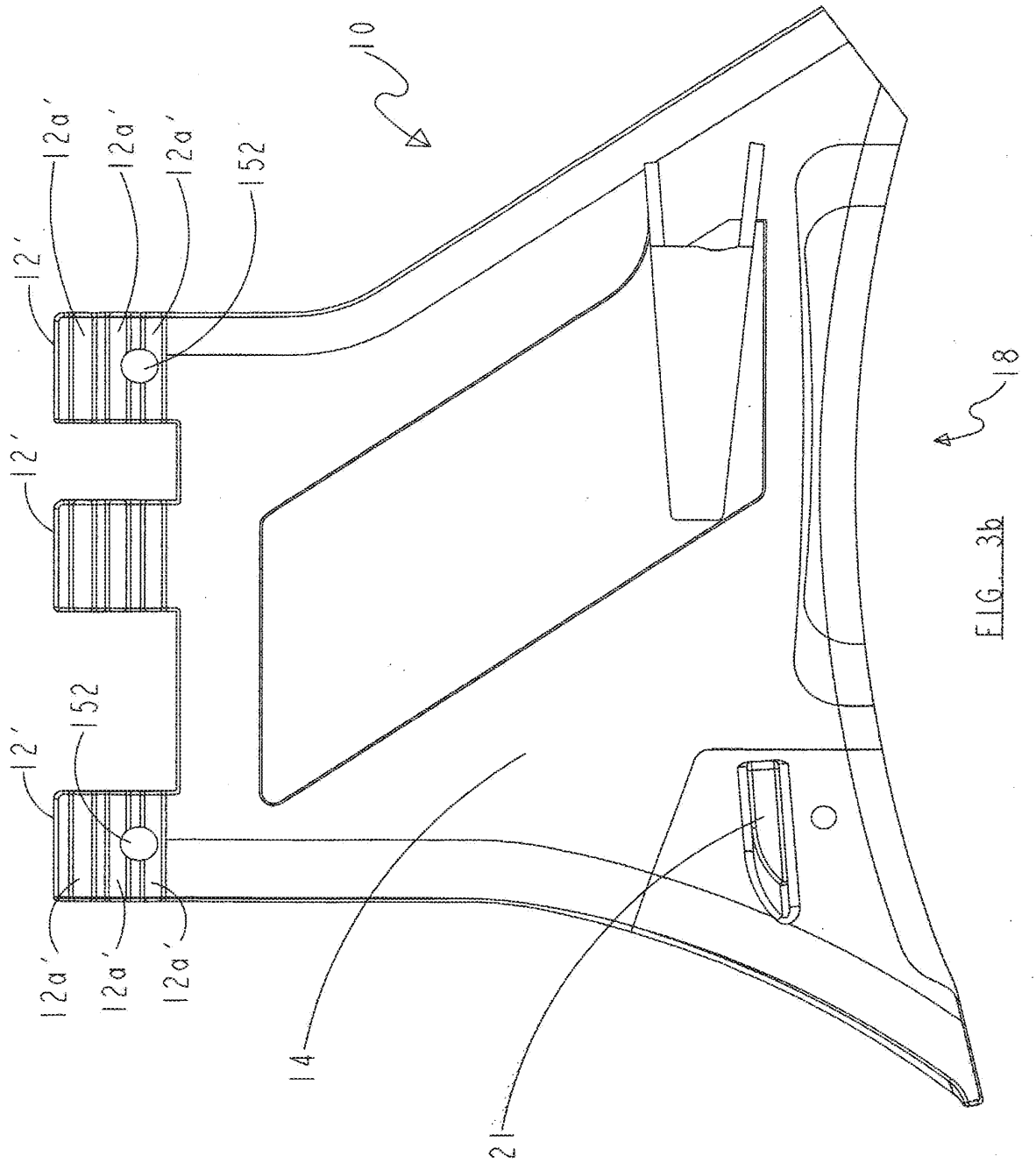


FIG. 3b

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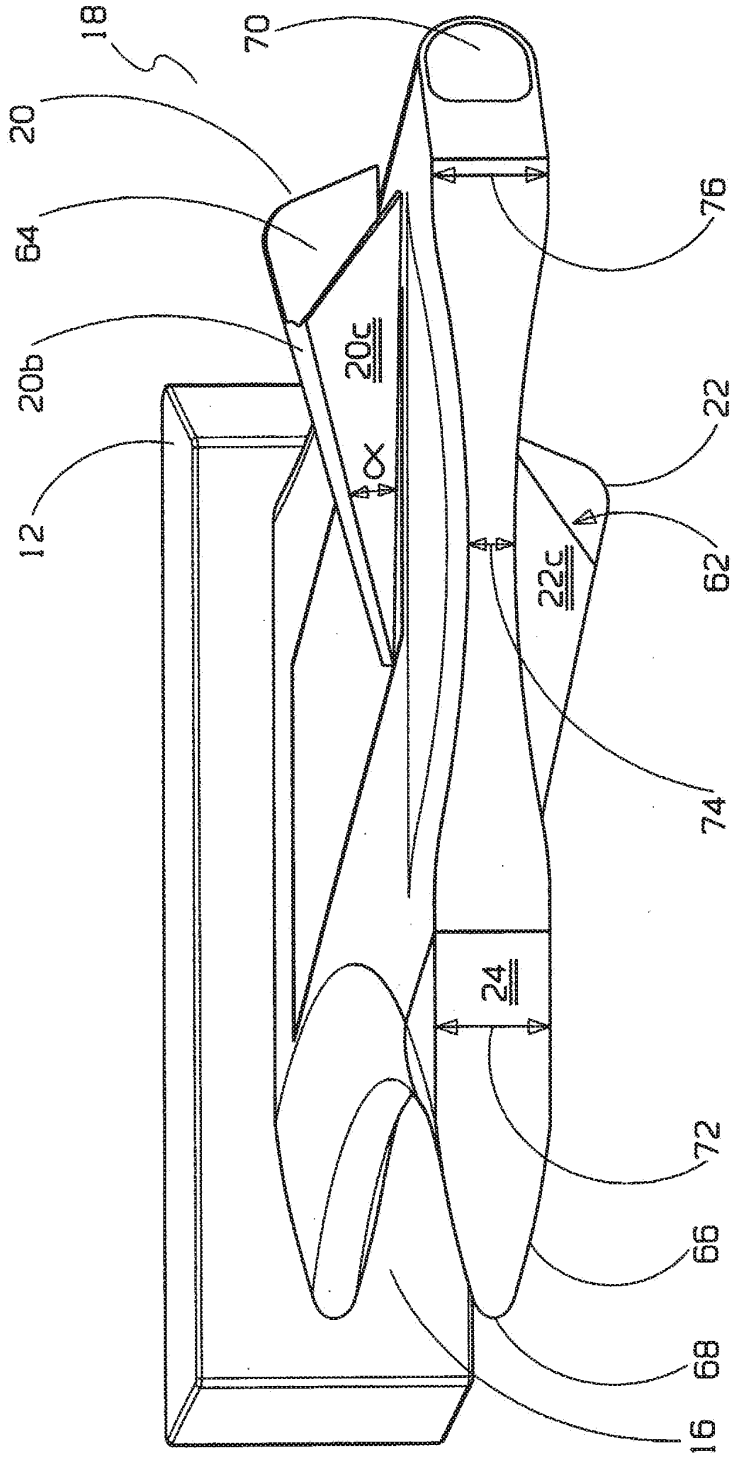


FIG. 4

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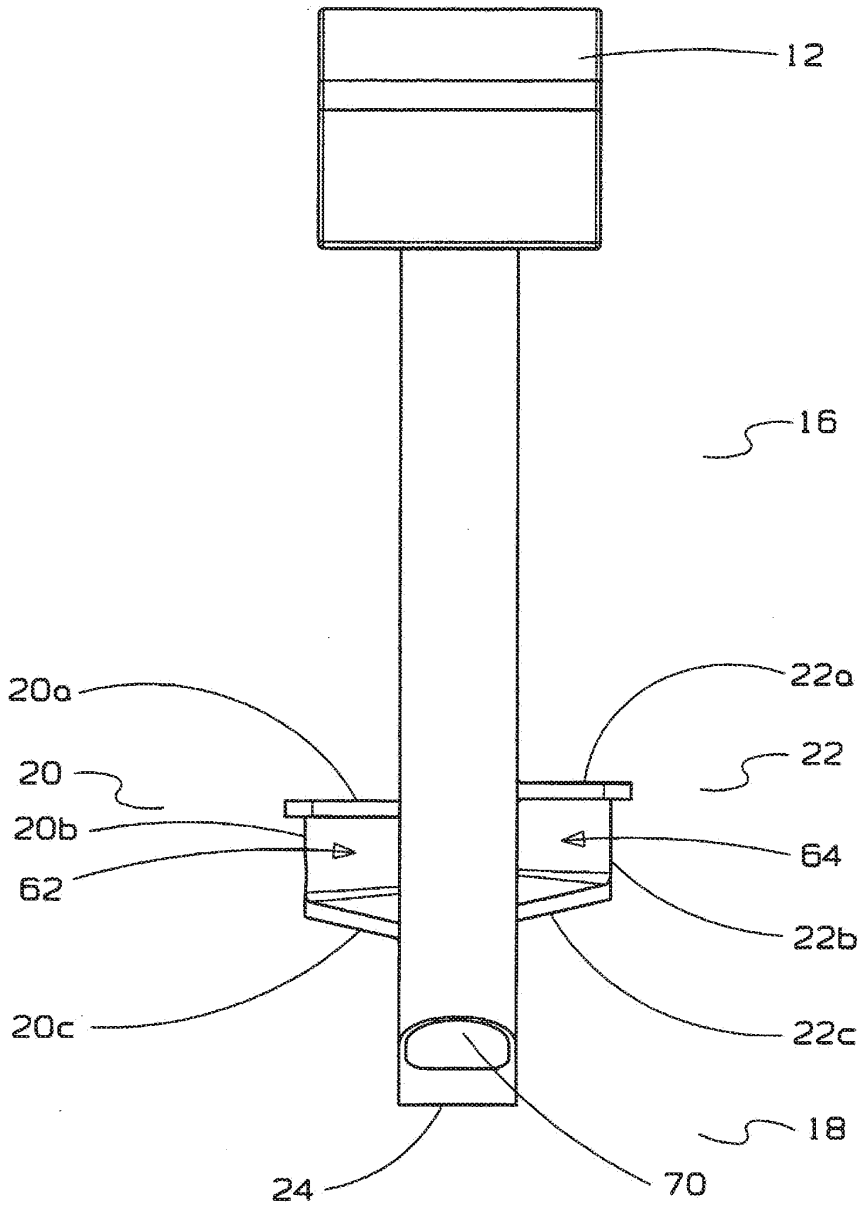


FIG. 5

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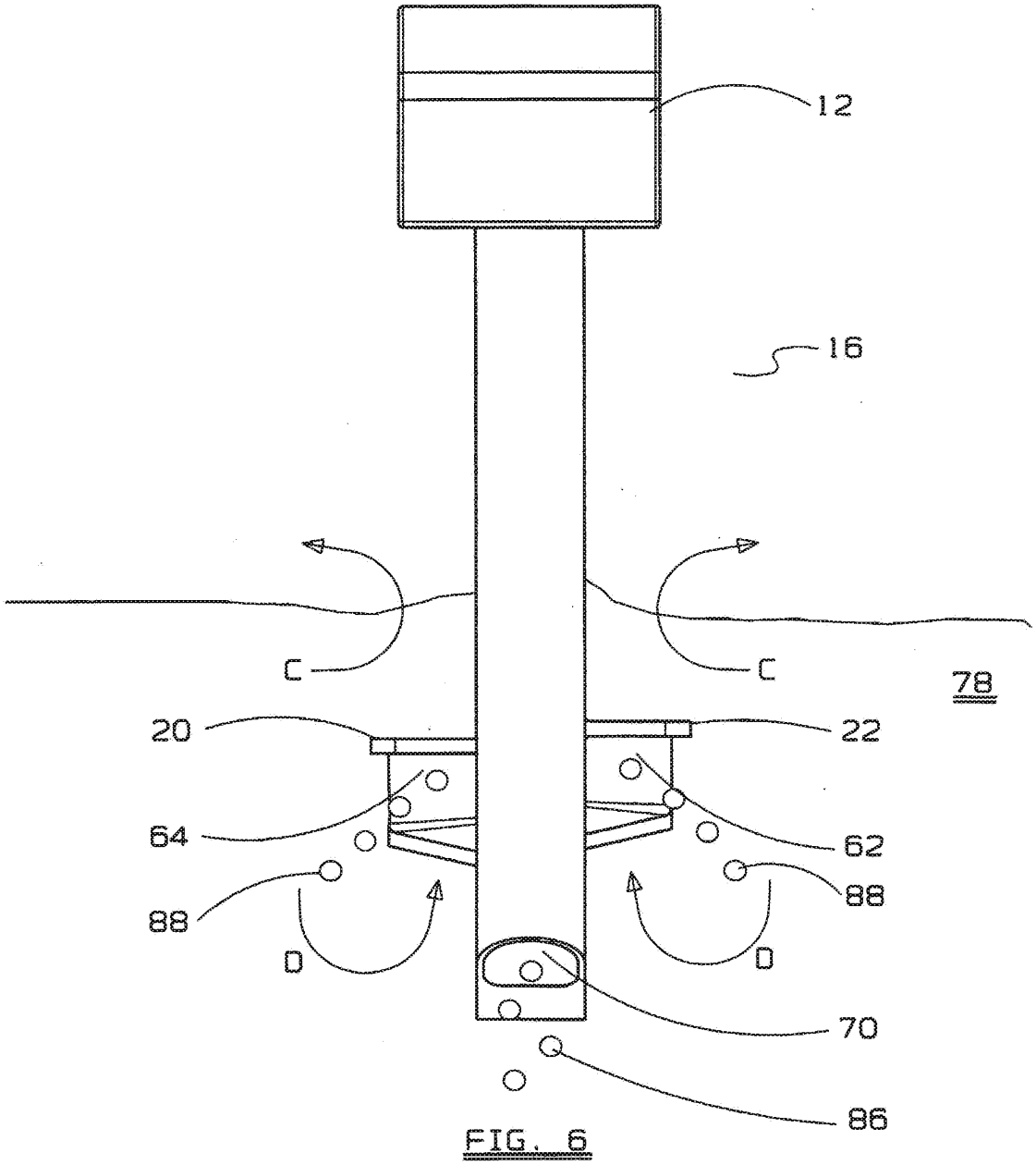


FIG. 6

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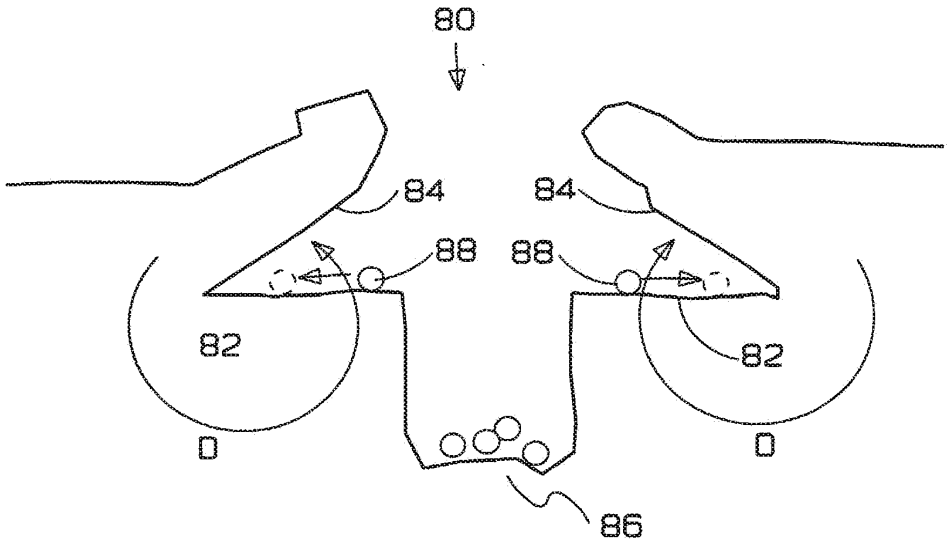


FIG. 7

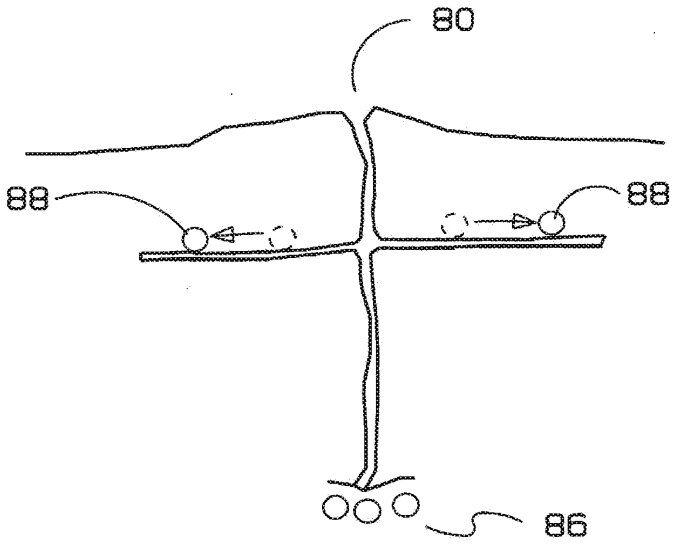


FIG. 8

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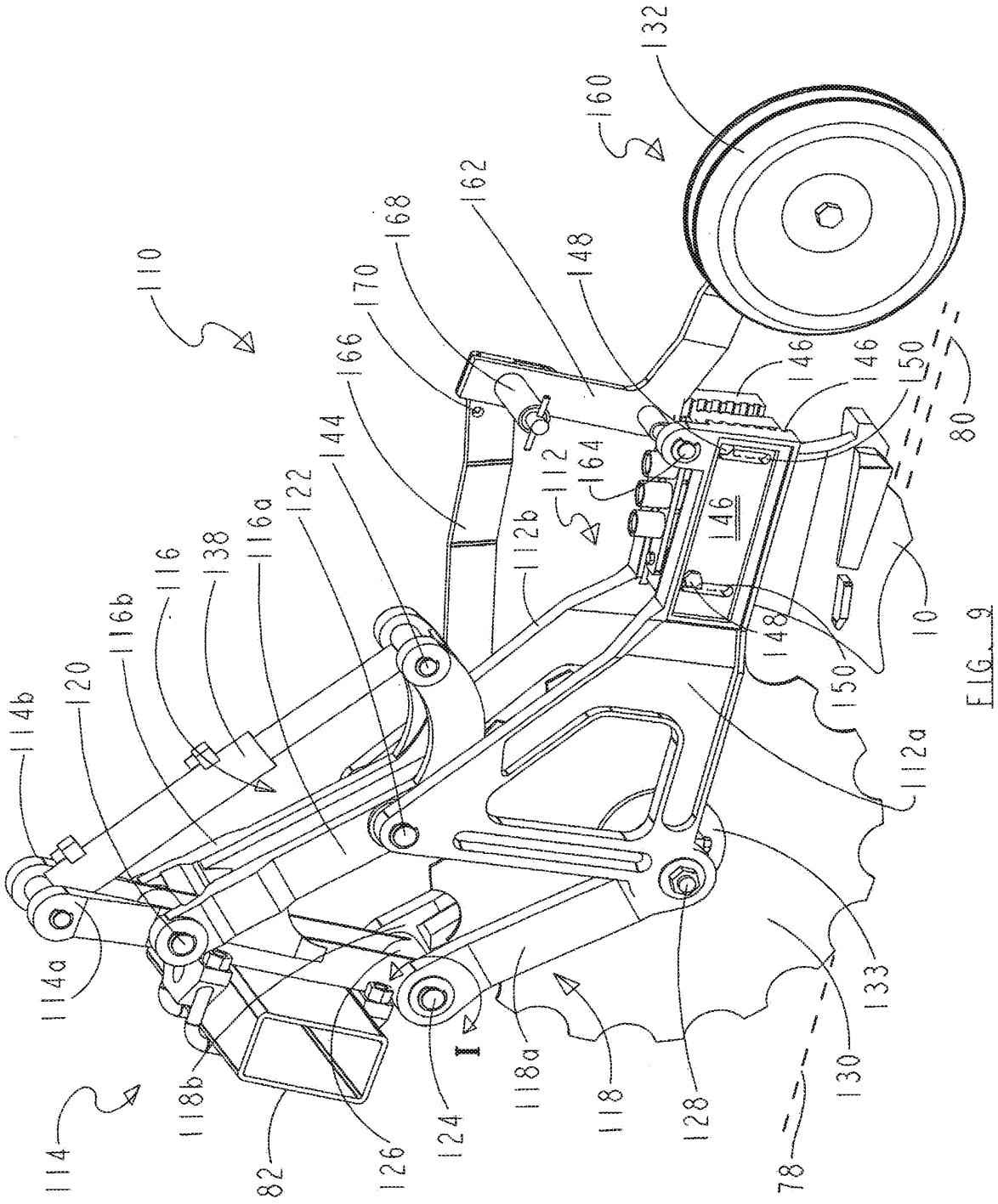


FIG. 9

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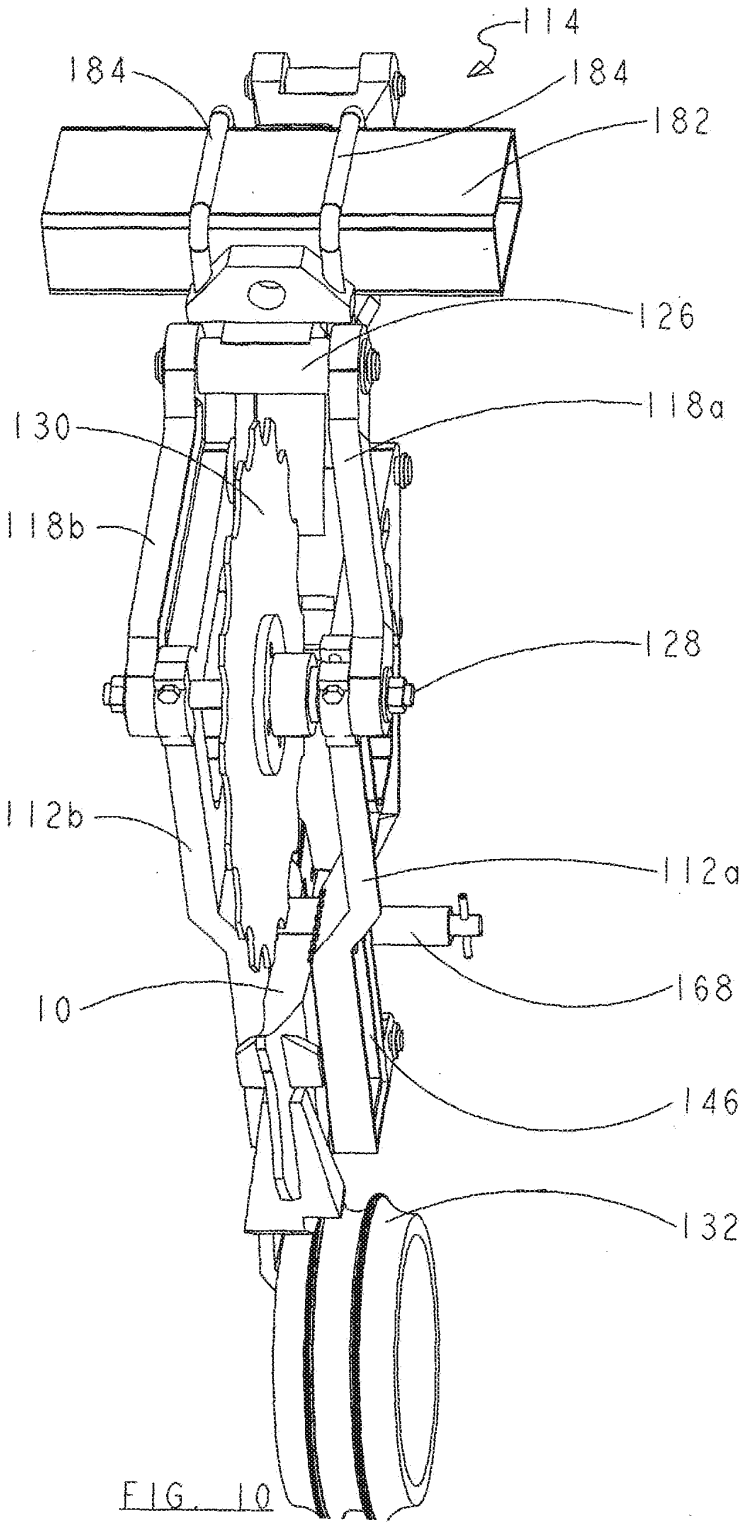


FIG. 10

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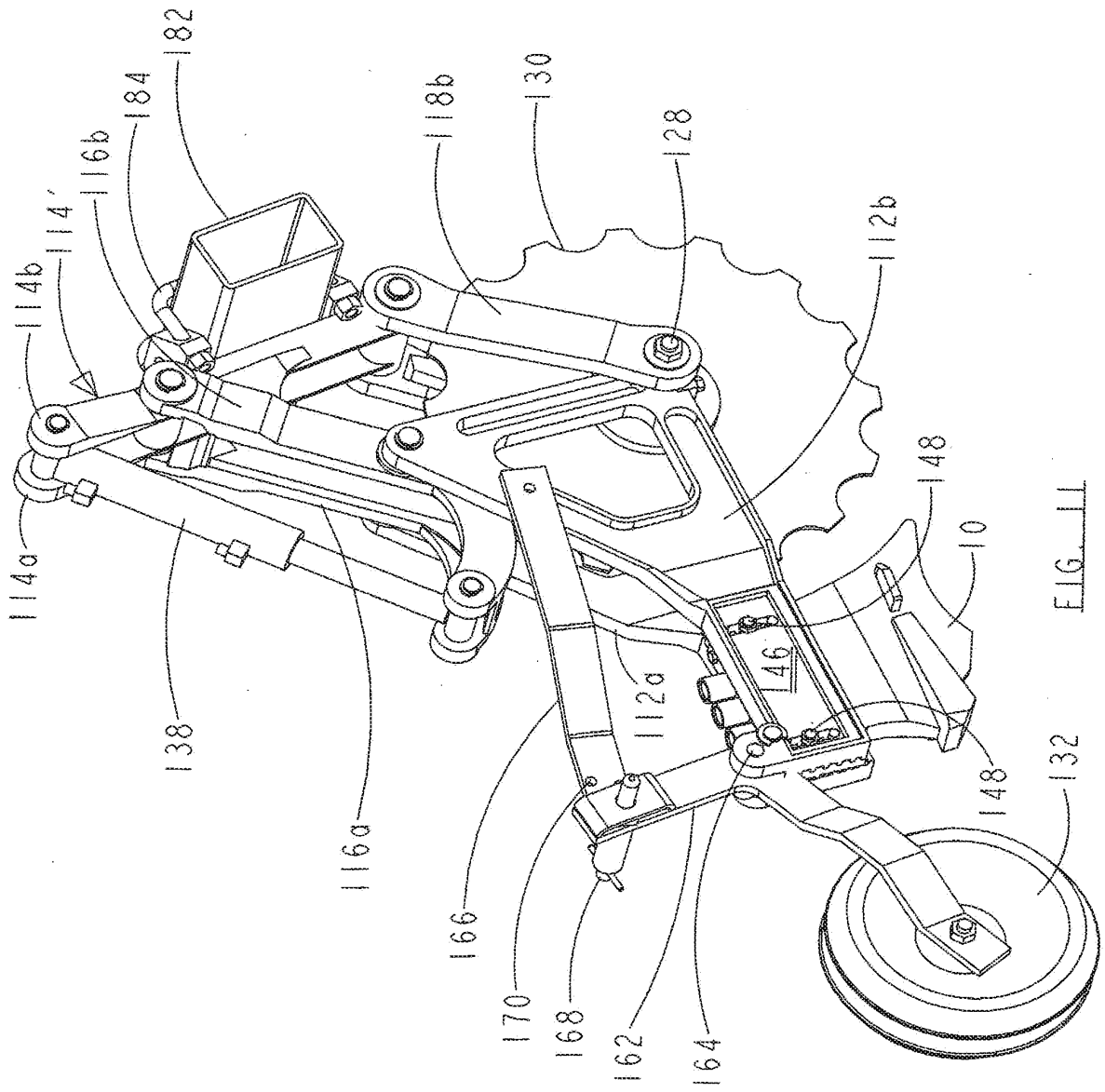


FIG. 11

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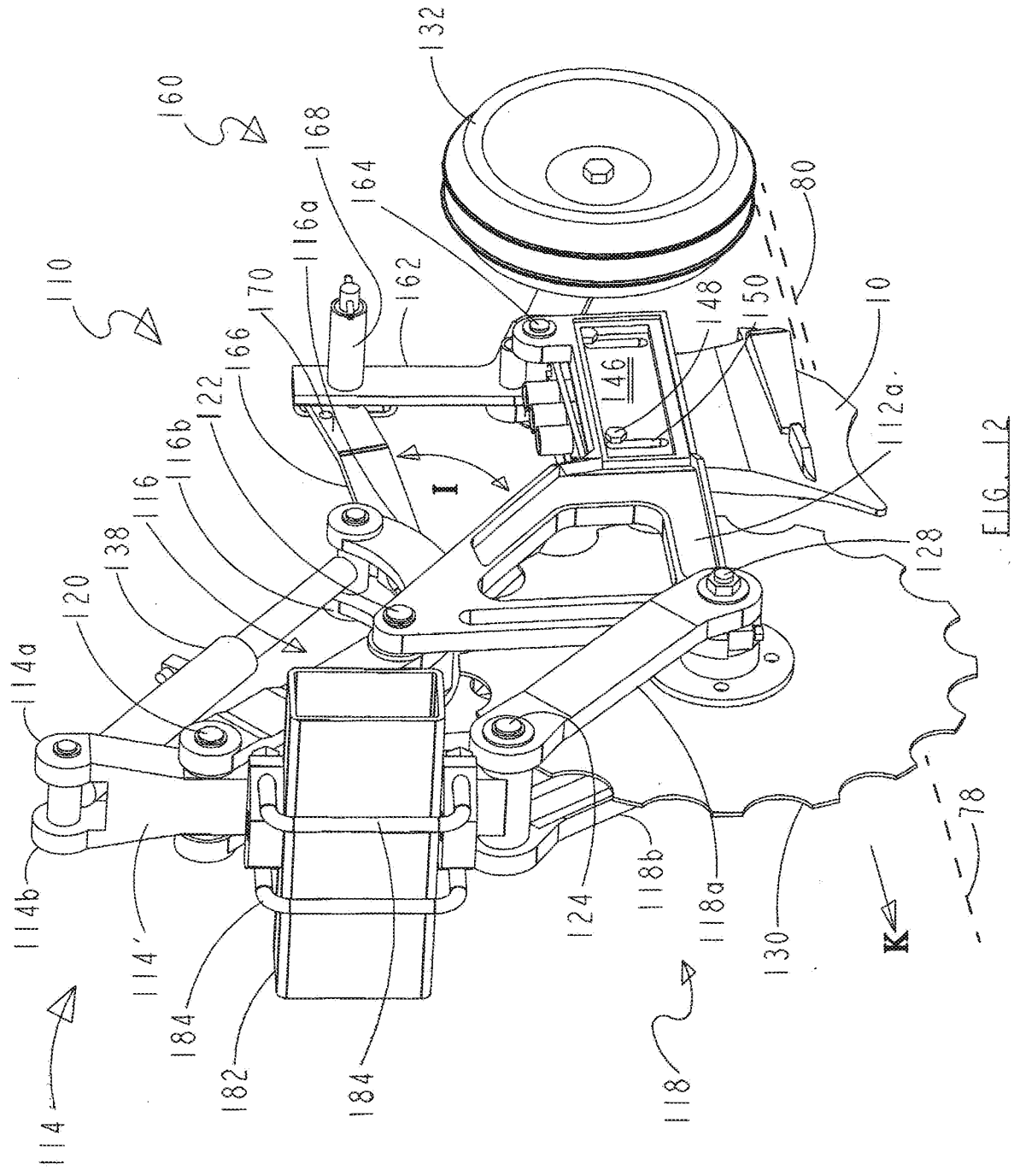


FIG. 12

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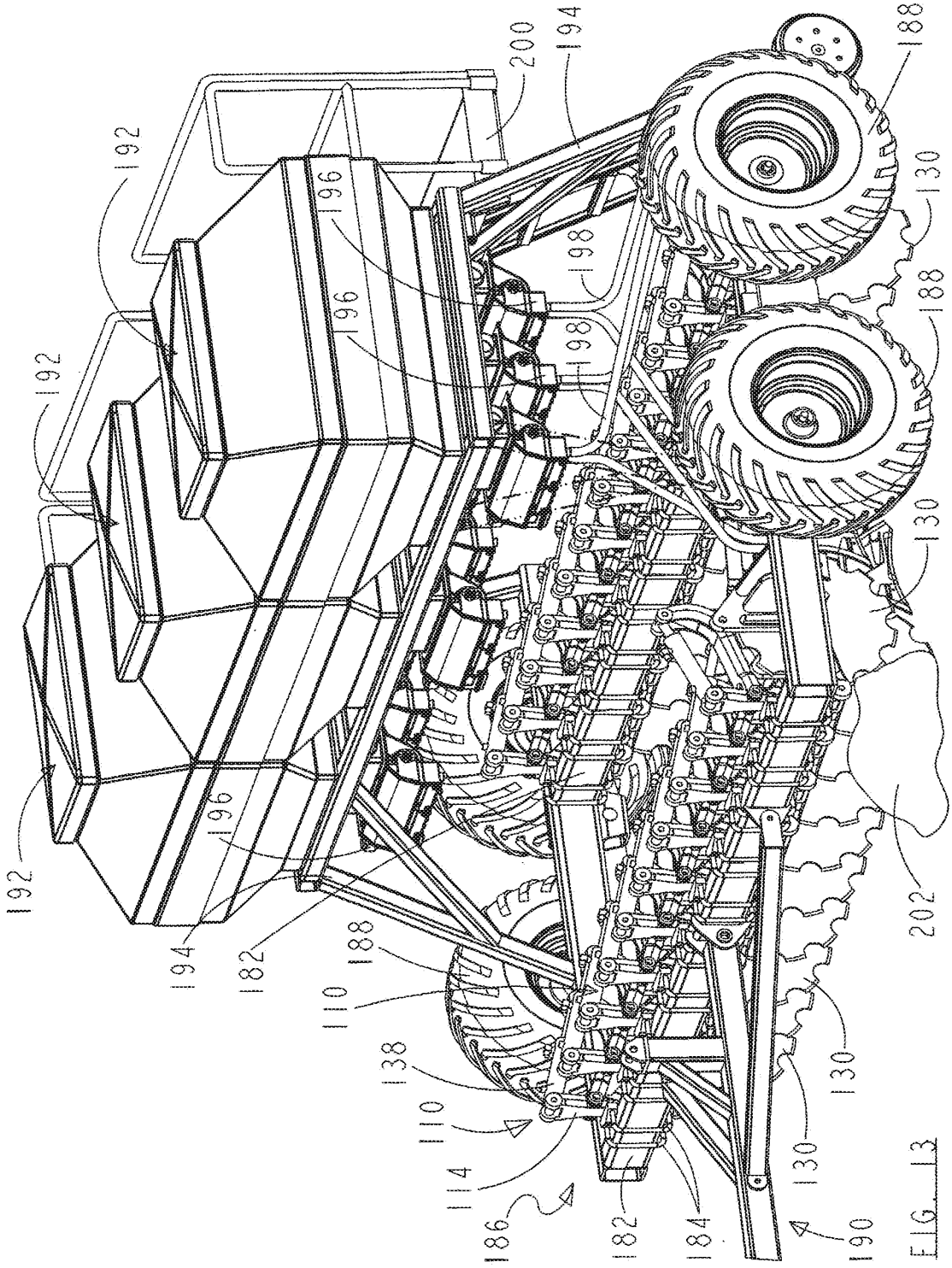


FIG. 13

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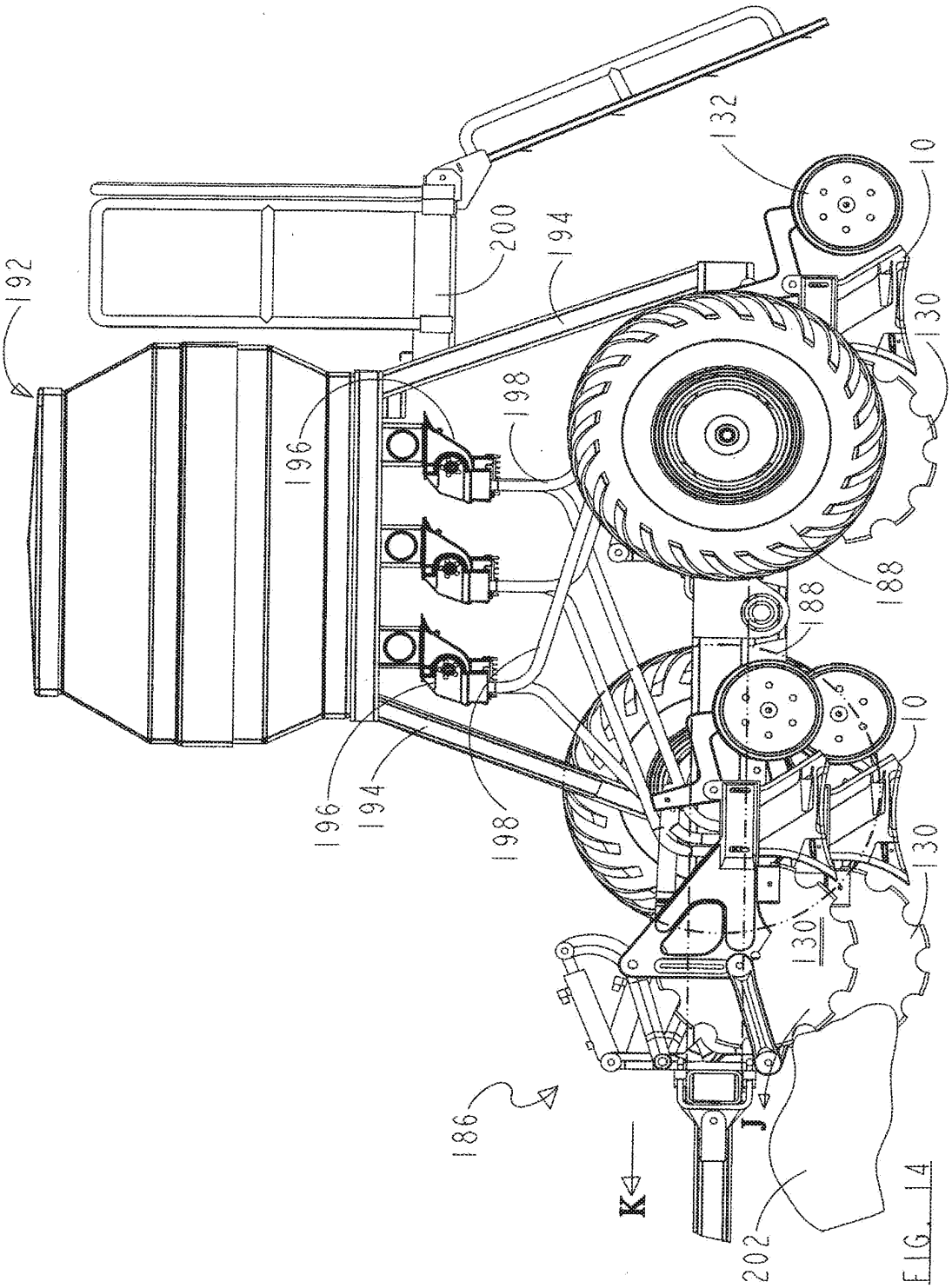


FIG. 14

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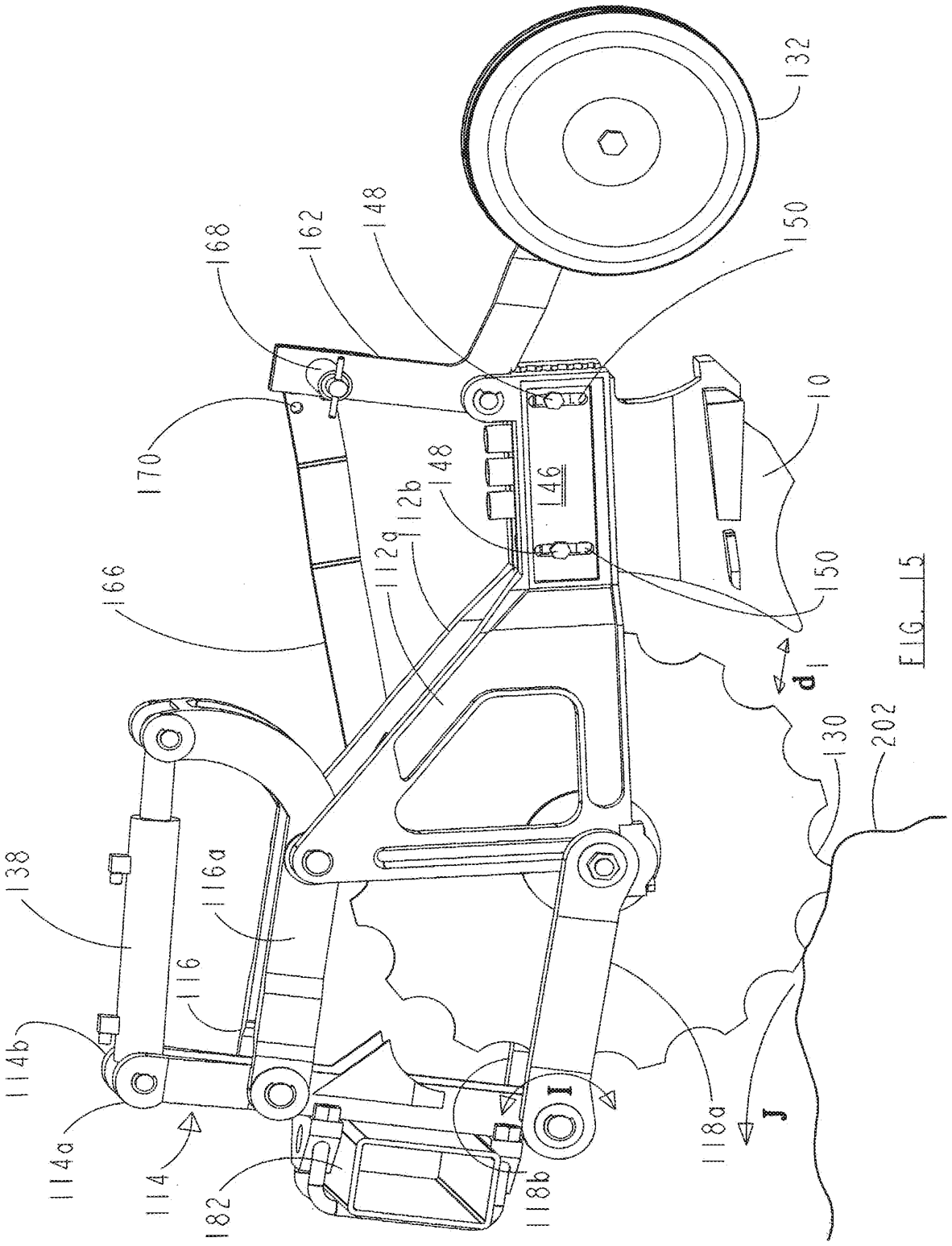


FIG. 15

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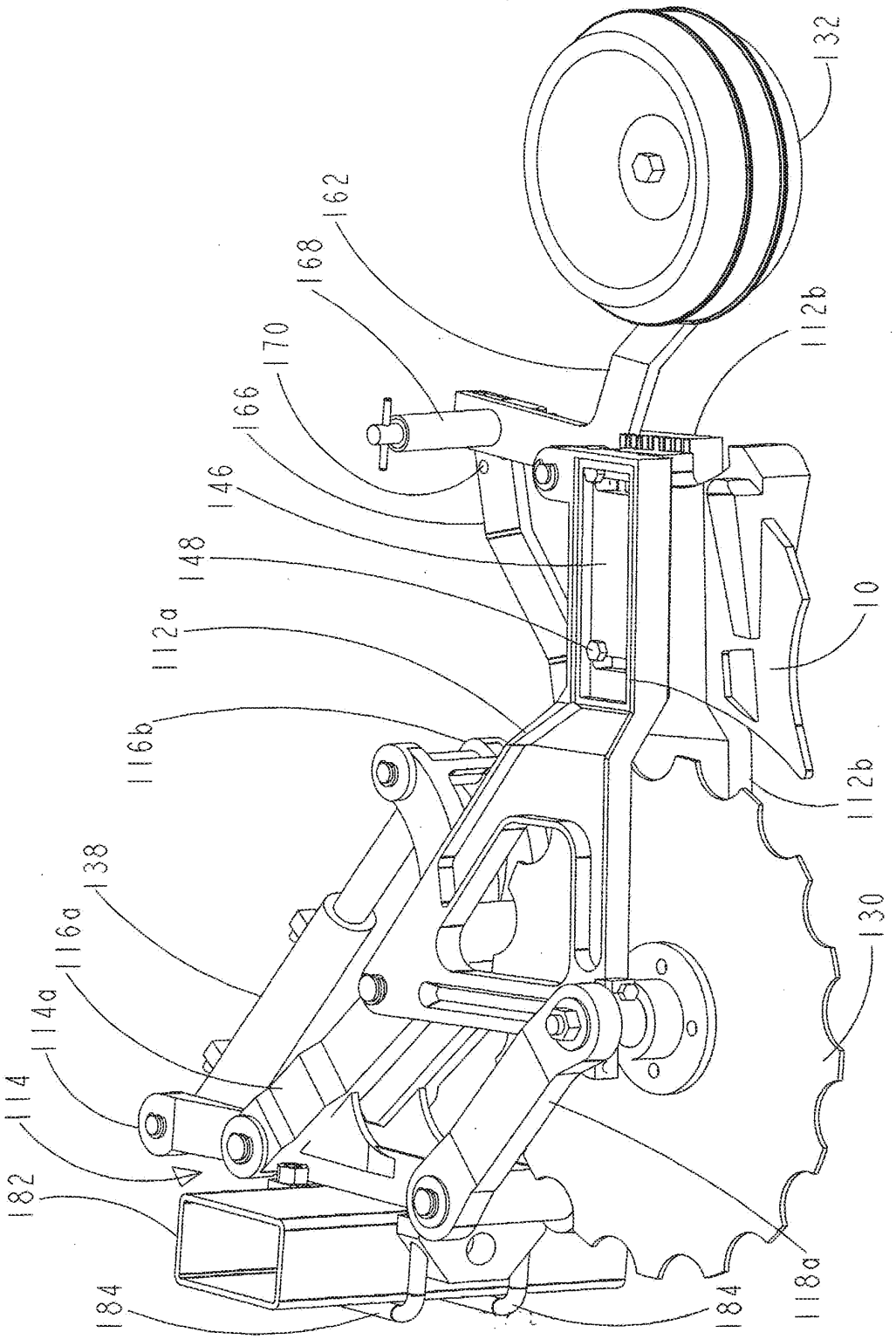


FIG. 16

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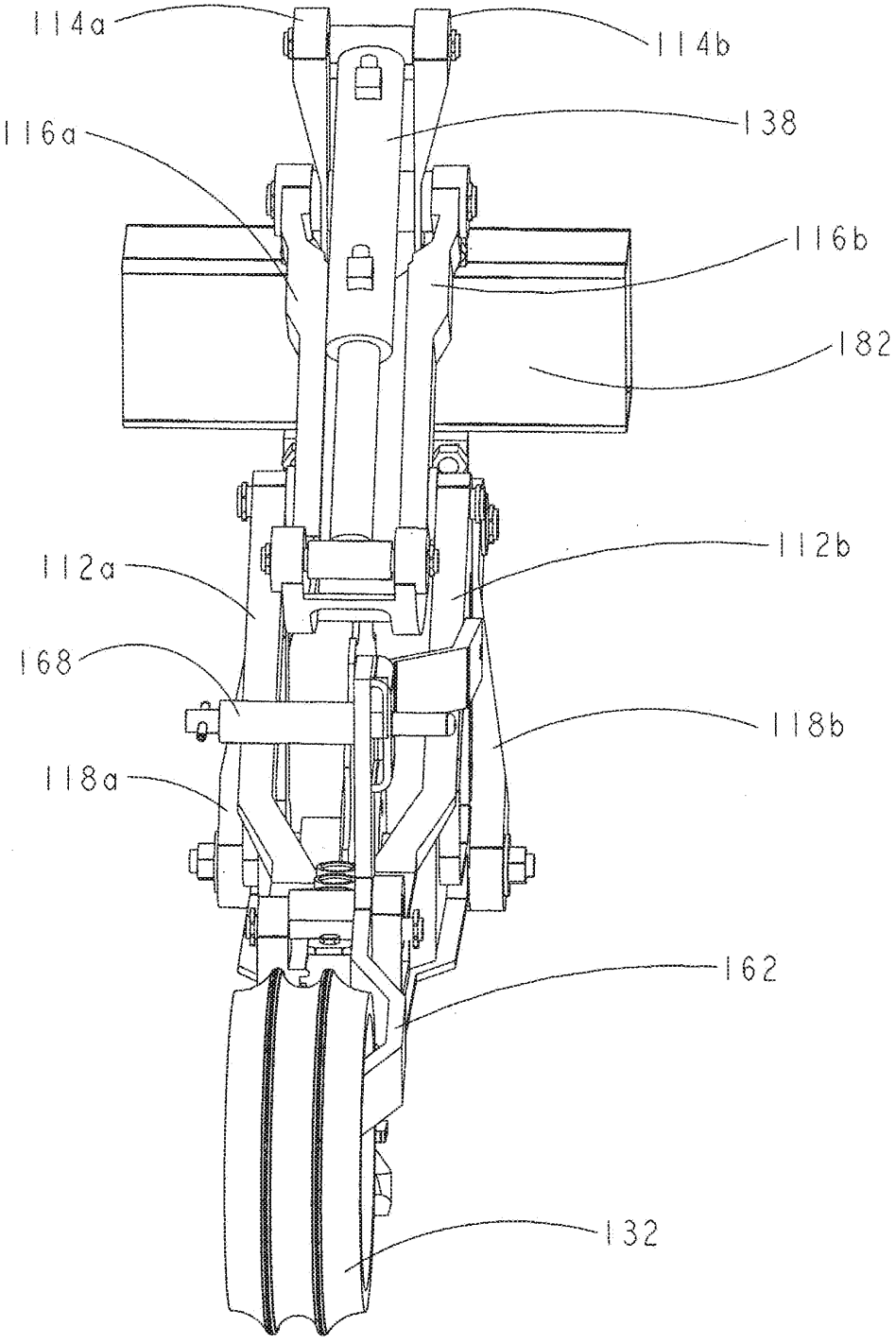


FIG. 17

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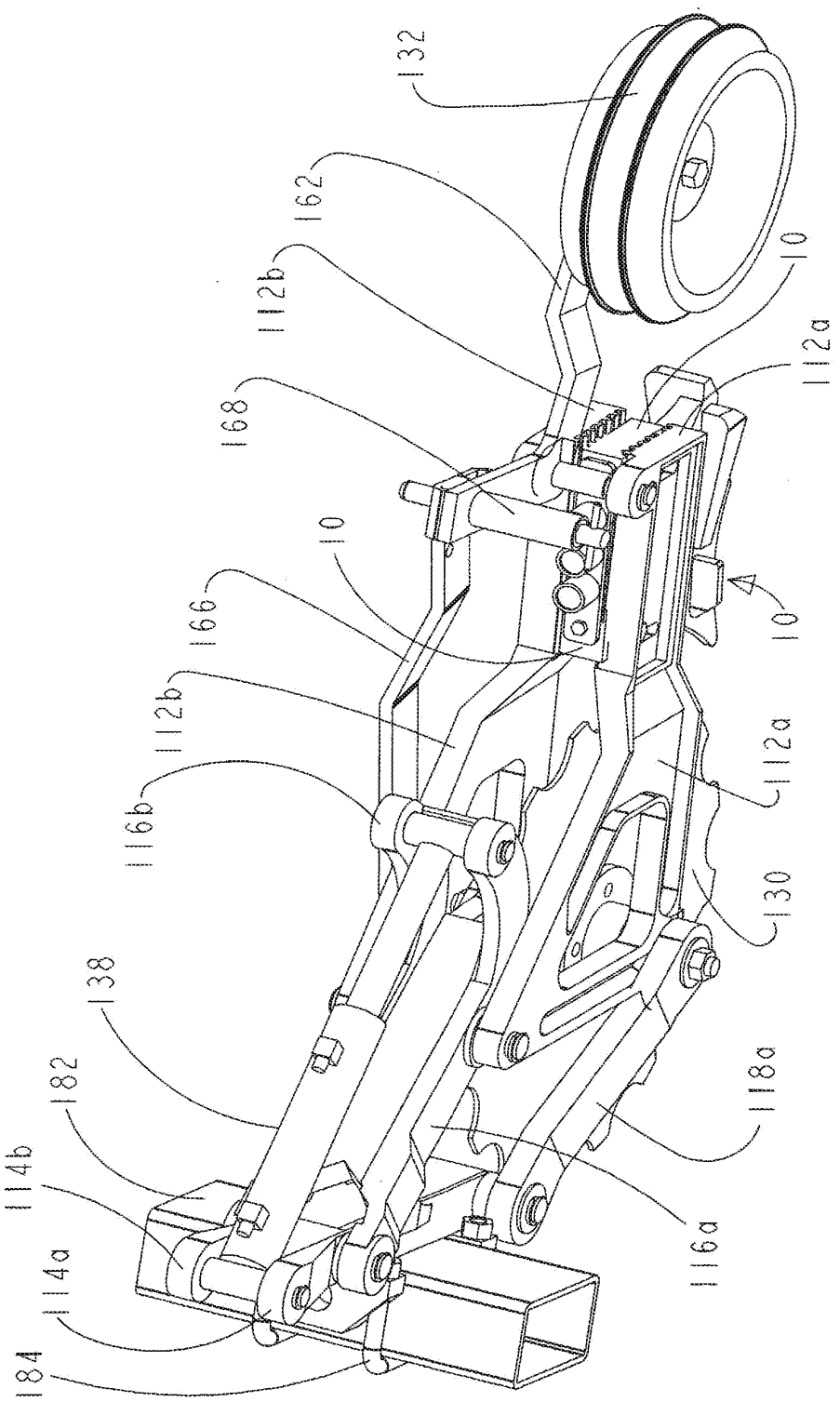


FIG. 18

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INTERNATIONAL SEARCH REPORT

Interna[illegible] application No
PCT/CA 03/00734

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A01C7/06 A01C5/08

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)
IPC 7 A01C

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	WO 00 67551 A (LEMPRIERE NOEL D) 16 November 2000 (2000-11-16) page 13, paragraph 2 -page 15, line 2; figure 9	1-7 8
Y	US 5 724 902 A (JANELLE LUC ET AL) 10 March 1998 (1998-03-10) column 6, line 45 - line 52; figure 1	8

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

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"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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 October 2003	24/10/2003

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Bunn, D

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Interna Application No
PCT/CA 03/00734

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0067551 A	16-11-2000	AU 757701 B2	06-03-2003
		AU 4388800 A	21-11-2000
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(71) Applicant: **PRECISION PLANTING LLC** [US/US]; 23207 Townline Road, Tremont, IL 61568 (US).

(72) Inventors: **SAUDER, Derek**; 14347 N Lake Windermere Road, Tremont, IL 61568 (US). **STOLLER, Jason**; 1045 E Polk, Morton, IL 61550 (US). **RADTKE, Ian**; 281 Circle Shore Drive, Washington, IL 61571 (US). **LEVY, Kent**; 28 Newberry Ct, Morton, IL 61550 (US).

(74) Agent: **OPPOLD, Thomas, J.**; Larkin Hoffman Daly & Lindgren Ltd., 1500 Wells Fargo Plaza, 7900 Xerxes Avenue South, Minneapolis, MN 55431 (US).

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Declarations under Rule 4.17:

---- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

---- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

---- *of inventorship (Rule 4.17(iv))*

[Continued on next page]

(54) Title: AGRICULTURAL TRENCH DEPTH SENSING SYSTEMS, METHODS, AND APPARATUS

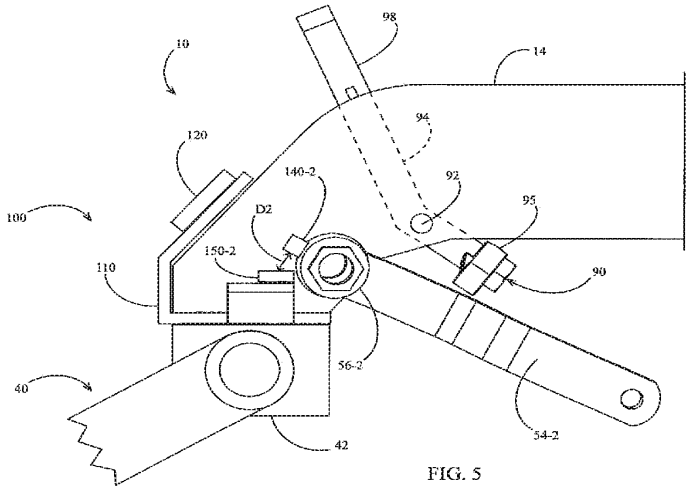


FIG. 5

(57) Abstract: Systems, methods and apparatus are provided for determining the depth of a trench opened by an agricultural planter. Sensors are provided for detecting the position of a ground-engaging element of the planter such as a gauge wheel or seed firmer of a row unit of the planter. Apparatus and methods are provided for installing such sensors onto a row unit of the planter. Systems, methods and apparatus are provided for controlling downpressure on a row unit based on the trench depth. Methods are provided for mapping trench depth measured by the depth sensors.

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AGRICULTURAL TRENCH DEPTH SENSING SYSTEMS, METHODS, AND APPARATUS

BACKGROUND

[0001] In recent years, farmers have recognized the need to select and maintain the proper planting depth to ensure the proper seed environment (e.g., temperature and moisture) and seedling emergence. To improve agronomic practices, it would also be desirable for the farmer to understand the relationship between actual planting depth and metrics such as emergence and yield. Conventional agricultural planters include only apparatus for adjusting a maximum planting depth, which may not be maintained during operation due to soil conditions or insufficient downpressure on the planter row unit. Even in operation of modern planters having sensors for determining whether full trench depth has been lost, the actual depth planted is still not determined. Thus there is a need for systems, methods and apparatus for measuring the depth of a trench opened by an agricultural planter.

DESCRIPTION OF THE DRAWINGS

[0002] FIG. 1 is a right side elevation view of an embodiment of an agricultural row unit.

[0003] FIG. 2 is a right side elevation view of another embodiment of an agricultural row unit with certain components removed for clarity.

[0004] FIG. 3 is a perspective view of the agricultural row unit of FIG. 2.

[0005] FIG. 4 is a perspective view of the agricultural row unit of FIG. 2 with a right gauge wheel removed for clarity.

[0006] FIG. 5 is an enlarged partial right side elevation view of the agricultural row unit of FIG. 2 having an embodiment of a depth sensor assembly installed.

[0007] FIG. 6 is a rear elevation view of the embodiment of FIG. 5.

[0008] FIG. 7 is an enlarged partial right side elevation view of a gauge wheel arm with an embodiment of a magnet installation bracket installed.

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[0009] FIG. 8 is an enlarged partial right side elevation view of another embodiment of a gauge wheel arm having a magnet mounting surface.

[0010] FIG. 9 schematically illustrates an embodiment of a depth sensor system installed on a tractor and planter.

[0011] FIG. 10 illustrates an embodiment of a process for calibrating a depth sensor.

[0012] FIG. 11 illustrates an embodiment of a process for mapping row unit depth measured by a depth sensor and for modifying row unit downforce based on row unit depth.

[0013] FIG. 12 is a side elevation view of another embodiment of a depth sensor.

[0014] FIG. 13 is a top view of the depth sensor of FIG. 12.

[0015] FIG. 14 illustrated an embodiment of a process for controlling trench depth.

DESCRIPTION

[0016] Referring to the drawings, wherein like reference numerals designate identical or corresponding parts throughout the several views, FIG. 1 illustrates an agricultural implement, e.g., a planter, comprising a toolbar 8 to which multiple row units 10 are mounted in transversely spaced relation. Each row unit 10 is preferably mounted to the toolbar by a parallel arm arrangement 16 such that the row unit is permitted to translate vertically with respect to the toolbar. An actuator 18 is preferably pivotally mounted to the toolbar 8 and the parallel arm arrangement 16 and configured to apply supplemental downpressure to the row unit 10.

[0017] The row unit 10 preferably includes a frame 14. The row unit 10 preferably includes an opening disc assembly 60 including two angled opening discs 62 rollingly mounted to a downwardly extending shank 15 of the frame 14 and disposed to open a v-shaped trench 3 in a soil surface 7 as the row unit traverses a field. The row unit 10 preferably includes a gauge wheel assembly 50 including two gauge wheels 52 pivotally mounted to either side of the frame 14 by two gauge wheel arms 54 and disposed to roll along the surface of the soil. A depth adjustment assembly 90 pivotally mounted to the frame 14 at a pivot 92 preferably contacts the gauge wheel arms 54 to limit the upward travel of the gauge wheel arms 54, thus limiting the

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depth of the trench opened by the opening disc assembly 60. A closing assembly 40 is preferably pivotally coupled to the frame 14 and configured to move soil back into the trench 3.

[0018] Continuing to refer to FIG. 1, seeds 5 are communicated from a hopper 12 to a seed meter 30 preferably configured to singulate the supplied seeds. The meter 30 is preferably a vacuum-type meter such as that disclosed in Applicant's co-pending international patent application no. PCT/US2012/030192 (Pub. No. WO/2012/129442), the disclosure of which is hereby incorporated by reference herein in its entirety. In operation, the seed meter 30 preferably deposits the supplied seeds into a seed tube 32. The seed tube 32 is preferably removably mounted to the frame 14. In operation, seeds 5 deposited by the meter 30 fall through the seed tube 32 into the trench 3.

[0019] Turning to FIGs. 2-5, the depth adjustment assembly 90 is illustrated in more detail. The depth adjustment assembly 90 includes a rocker 95 pivotally mounted to a depth adjustment body 94. The depth adjustment body 94 is pivotally mounted to the row unit frame 14 about the pivot 92. A handle 98 is preferably slidably received within the depth adjustment body 94 such that the user can selectively engage and disengage the handle with one of a plurality of depth adjustment slots 97 (FIG. 6) formed within the row unit frame 14. In operation, the upward travel of the gauge wheels 52 is limited by contact of the gauge wheel arms 54 with the rocker 95. When one of the gauge wheels, e.g., left gauge wheel 52-1, encounters an obstruction, the rocker 95 allows the left gauge wheel arm 54-1 to travel upward while lowering the right gauge wheel 52-2 by the same absolute displacement such that the row unit 10 rises by half the height of the obstruction.

Depth sensing apparatus

[0020] Referring to FIGs. 5 and 6, a depth sensor assembly 100 is shown installed on the row unit 10. The depth sensor assembly 100 includes a mounting bracket 110, preferably mounted between the row unit frame 14 and a closing wheel mounting block 42 to which the closing assembly 40 is pivotally mounted. A magnet 140 is preferably mounted to a pivot portion 56 of each gauge wheel arm 54 such that the magnet 140 travels along a circular path as the associated gauge wheel arm is rotated. A depth sensor 150, preferably comprising a Hall-effect sensor, is preferably supported by the bracket 110 in a position adjacent to each magnet 140 on either side

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of the row unit frame 14. The bracket 110 preferably supports the depth sensor 150 in a position that maximizes proximity to the magnet 140 without interfering with the magnet 140 when the gauge wheel 52 is raised to an extreme position. The bracket 110 preferably additionally supports a signal processor 120. In operation, both depth sensors 150-1,150-2 preferably generate a signal inversely related to the distance D1, D2 between the depth sensors 150-1,150-2 and the associated magnets 140-1,140-2, respectively. For example, as the right gauge wheel arm 54-2 lowers (i.e., rotates clockwise on the view of FIG. 5), the magnet 140-2 rotates clockwise such that the distance D2 increases and the signal generated by the depth sensor 150-2 decreases.

[0021] It should be appreciated that the depth sensor 150 comprises a position sensor configured to generate a signal related to the position of an object, in this case the magnet 140 and thus the gauge wheel arm to which the magnet is mounted. In alternative embodiments, a depth sensor 150 is mounted to the pivot portion 56 of each gauge wheel arm 54 and a magnet 140 is mounted to the bracket 110.

[0022] It should be appreciated that the pivot portion 56 of a conventional gauge wheel arm is not conducive to mounting the magnet 140 in a precise location such that the signals generated by the depth sensor 150 are predictable. Referring to FIG. 7, a mounting assembly 200 is illustrated including a circumferential mounting rim 210. The mounting rim 210 preferably includes a flat mounting surface 214 to which the magnet 140 is mounted. The mounting rim 210 is preferably sized to surround a portion of the pivot portion 56 of the gauge wheel arm 54. The mounting rim 210 is preferably configured to receive a group of set screws 220 at radially spaced locations. In installation of the mounting rim 210, the set screws 220 are threaded into the mounting rim 210 to mount the mounting rim to the pivot portion 56. In some embodiments, a cylindrical guide (not shown) is inserted in a gap between the mounting rim 210 and the pivot portion 56 while the set screws 220 are inserted in order to ensure that the mounting rim is concentrically and symmetrically positioned with respect to the pivot portion. In order to ensure consistent angular positioning of the mounting rim 210 relative to the pivot portion 56, in some embodiments the mounting rim 210 includes an opening 212 sized to receive a grease zerk 58 in the gauge wheel arm 54. A grease gun (not shown) is used to insert grease through the grease zerk 58 into the joint between the gauge wheel arm 54 and the row unit frame 14. The opening

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212 is preferably sized such that the grease gun can be tightly fit inside the opening 212 between around the grease zerk 58, fixing the angular orientation of the mounting rim 210 relative to the pivot portion 56. The position of the opening 212 relative to the mounting surface 214 is preferably selected so that the mounting surface (as well as the magnet mounted to the mounting surface) is in a defined position with respect to the gauge wheel arm. With the magnet in the defined position, when the gauge wheel arm is at a full depth position, the magnet 140 is preferably within a reliably detectable distance of the depth sensor 150.

[0023] Turning to FIG. 8, in other embodiments a modified gauge wheel arm 54' includes a flat mounting surface 57 in the pivot portion 56. The magnet 140 is preferably mounted directly to the mounting surface 57.

[0024] Turning to FIGs. 12 and 13, in other embodiments a depth sensor 1220 is used to measure the vertical position of the row unit relative to the soil surface 7. The depth sensor 1220 preferably includes a pivot arm 1222 pivotally mounted to a bracket 1210. The bracket 1210 is preferably mounted to a lower portion of the shank 15. In some embodiments a resilient seed firmer 1214 is also mounted to the bracket 1210. In such embodiments, the bracket 1210 preferably extends around the seed tube 32 as best illustrated in FIG. 12. The pivot arm preferably includes left and right ground-engaging fingers 1224-1, 1224-2, respectively. The ground-engaging portions of the fingers 1224 are preferably spaced by a transverse spacing wider than the trench 3 such that the fingers 1224 contact the soil surface 7 on either side of the trench.

[0025] A sensor is preferably used to generate a signal related to the angular position of the pivot arm 1222. In the illustrated embodiment, the pivot arm 1222 is pivotally mounted to the bracket 1210 via a rotary encoder 1226 (e.g., an angular displacement sensor no. 55250 available from Hamlin Incorporated, Lake Mills, Wisconsin). In operation, the fingers 1224 ride along the soil surface 7 such that the angular position of the pivot arm is constrained by the vertical height of the row unit 10 relative to the soil surface. A signal generated by the encoder 1226 is thus related to the vertical height of the row unit 10 with respect to the soil, and thus to the depth of the trench 3.

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Depth sensing systems

[0026] A depth sensing system 500 for measuring row unit downforce and modifying downpressure is illustrated in FIG. 9. The depth sensors 150-1,150-2 mounted to each row unit 10 (or in other embodiments the depth sensor 1220) are preferably in electrical communication with the processor 120. The processor 120 is preferably in electrical communication with a monitor 540, which is preferably mounted in a cab 80 of a tractor drawing the planter. The monitor 540 is preferably in electrical communication with a fluid control system 530. The fluid control system 530 is preferably in fluid communication with the actuator 18. The fluid control system 530 is preferably configured to modify the pressure applied by the actuator 18 on the row unit 10. In some embodiments, the fluid control system 530 preferably includes electro-hydraulic solenoid valves in fluid communication with a down chamber and a lift chamber of the actuator 18. The fluid control system 530 is preferably configured to control the pressure supplied to the actuator 18 in a pressure control mode to maintain a selected pressure in the actuator, e.g., using solenoid operated pressure reducing-relieving valves. The monitor 540 preferably includes a central processing unit, a memory, and a graphical user interface configured to display the depth measured by the depth sensor assembly 100. The monitor 540 preferably includes processing circuitry configured to modify a command signal to the fluid control system 530 based on an input from the depth sensor assembly 100. The command signal preferably corresponds to a selected pressure. The monitor 540 is also preferably in electrical communication with a GPS receiver 550 mounted to the tractor or the planter.

[0027] In some embodiments of the depth sensing system, the monitor 540 is additionally in electrical communication with a depth adjuster 160. The depth adjuster 160 is preferably configured to pivot the depth adjustment assembly 90 in order to modify the depth of the trench 3. In some embodiments the depth adjuster 160 comprises a depth adjustment apparatus as disclosed in U.S. Patent Application No. 2013/0104785, the disclosure of which is hereby incorporated herein by reference. The monitor 540 is preferably configured to send a command signal to the depth adjuster 160 to instruct the depth adjuster to modify the depth of the trench 3. The monitor 540 is further preferably configured to modify the depth adjuster command signal based on a signal received from one of the depth sensing apparatus described herein.

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Depth sensor calibration methods

[0028] It should be appreciated that even with consistent mounting locations of the magnet 140 on the gauge wheel arm 54, two primary factors will affect the correlation between the depth sensor signal and the actual depth of the trench 3. First, circumferential wear on the opener discs 62 requires the gauge wheels 52 to rise further (i.e., rotate further counter-clockwise on the view of FIG. 1) in order to effect the same trench depth. The same wear on the opener discs 62 will affect the magnitude of a signal (the "zero-depth signal") generated when the bottom of the gauge wheel 52 is even with the bottom of the opener disc 62; in operation, this configuration indicates that the bottom of the opener disc is even with the soil surface 7, resulting in zero trench depth. Second, the operator will regularly add or remove shims from the joint between the gauge wheel arm 54 and the row unit frame 14 in order to maintain a tight fit between an inner surface of the gauge wheel 52 and an outer surface of the corresponding opener disc 62. Referring to FIG. 6, adding or removing shims (not shown) moves the gauge wheel arm 54 to the right or left, modifying the distance D (and thus the depth sensor signal) for the same orientation of the gauge wheel 52.

[0029] A process 400 for calibrating the depth sensor 150 is illustrated in FIG. 10. At step 405, the user preferably raises the toolbar 8 such that the gauge wheel arm 54 lowers to its lowest position against a stop (not shown) provided on the row unit frame 14. At step 410, the monitor 540 preferably records a first depth sensor signal at in this fully-dropped position, which it should be appreciated corresponds to the maximum distance between the magnet 140 and the depth sensor 150. At step 415, monitor 540 preferably selects a calibration curve based on the first depth sensor signal. Multiple calibration curves relating signal level to depth are preferably developed and stored in the memory of the monitor 540; the monitor 540 preferably selects the calibration curve having the minimum signal level closest to the first depth sensor signal recorded at step 410. At step 420, the user preferably lowers the planter onto a hard surface such that the signal generated by the 150 corresponds to the zero-depth signal. At step 425, the monitor 540 preferably records a second depth sensor signal corresponding to the zero-depth position. At step 430, the monitor 540 preferably shifts the calibration curve selected at step 415 such that the zero-depth signal corresponds to the second depth sensor signal.

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[0030] Continuing to refer to the process 400, at step 435 the user preferably initiates planting operations such that the opener discs 62 penetrate the soil surface 7. At step 440 the monitor 540 records a third depth sensor signal during planting operations. At step 445, the monitor 540 looks up the depth corresponding to the third depth sensor signal using the calibration curve selected at step 415 and shifted at step 430.

Depth mapping and depth-based downpressure and depth control methods

[0031] A process 600 for mapping depth and adjusting downpressure based on measured depth is illustrated in FIG. 11. At step 605, the monitor 540 preferably records and time-stamps the GPS position of the planter reported by the GPS receiver 550. At step 610, the monitor 540 preferably receives signals from both depth sensors 150-1,150-2 associated with each row unit (or one of the other depth sensor embodiments described herein) and looks up depth measurements corresponding to both signals on a calibration curve (e.g., as in step 445 of process 400). At step 615, the monitor 540 preferably stores and time-stamps the average of both depth measurements (the "measured depth") at each row unit. At step 620, the monitor 540 preferably displays an image correlated to the measured depth on a map at a map location corresponding to the GPS position of the planter at the time of the depth measurements. For example, in some embodiments the monitor 540 displays a legend correlating colors to ranges of depth. In some such embodiments, the depth range less than zero is correlated to a single color while a set of depth ranges greater than zero are correlated to a set of colors such that the color intensity increases with depth.

[0032] Continuing to refer to the process 600, at step 625 the monitor 540 preferably compares the measured depth to the full or desired depth. At step 630 the monitor determines whether the measured depth is equal to (or within a percentage error of) full depth. If measured depth is not equal to full depth, then at step 635 the monitor 540 determines whether the measured depth is less than zero. If the measured depth is less than zero, then at step 640 the monitor 540 preferably adjusts a signal sent to the fluid control system 530 to increase downpressure applied by the actuator 18 by a first increment. If the measured depth is greater than zero, then at step 645 the monitor 540 preferably adjusts a signal sent to the fluid control system 530 to increase downpressure applied by the actuator 18 by a second increment; the second increment is

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preferably smaller than the first increment.

[0033] Turning to FIG. 14, a process 1400 for controlling depth based on the signal generated by one of the depth sensors described herein. At step 1410, the monitor 540 preferably estimates the depth of the trench 3 based on the depth sensor signal. At step 1420, the monitor 540 preferably compares the measured depth to a selected depth entered by the user or previously stored in memory. The selected depth may be selected using the methods disclosed in U.S. Provisional Application No. 61/783,591, the disclosure of which is hereby incorporated by reference. If at step 1430 the measured depth is not equal to or within a threshold range (e.g. 5%) of the selected depth, then at step 1440 the monitor 540 preferably sends a modified command signal to the depth adjuster 160 in order to bring the measured depth closer to the selected depth; for example, if the measured depth is shallower than the selected depth, then the monitor 540 preferably commands the depth adjuster to rotate the depth adjustment assembly 90 in order to increase the trench depth.

Alternative depth sensor embodiments

[0034] In another embodiment of the depth sensor assembly 100, the single magnet 140 is replaced with an array of magnets arranged radially around the pivot portion 56 of gauge wheel arm 54. Each magnet in the array preferably has the opposite polarity of its neighboring magnets. A depth sensor is preferably mounted to a sidewall of the row unit frame such that magnets having opposing poles pass by the depth sensor as the gauge wheel arm 54 rotates. The depth sensor preferably comprises a Hall-effect sensor such as model no. AS5304 available from Austria Microsystems in 8141 Schloss Premstätten, Austria.

[0035] In still another embodiment of the depth sensor assembly 100, the depth sensor 150 is replaced with a rotary sensor mounted to the end of a bolt used to secure the gauge wheel arm 54 in position relative to the row unit frame. The rotary sensor generates a signal related to the position of the gauge wheel arm 54 relative to the bolt.

[0036] In yet another embodiment of the depth sensor assembly 100, the depth sensor 150 is replaced with a rotary sensor mounted to the row unit frame 14. A two-bar linkage preferably connects the gauge wheel arm 54 to the rotary sensor such that the rotary sensor generates a

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signal related to the position of the gauge wheel arm 54 relative to the row unit frame 14.

[0037] In another embodiment, a seed firmer similar to the seed firmer embodiments disclosed in U.S. patent no. 5,425,318 is provided with a depth sensor assembly configured to measure the distance between a soil-engaging portion of the seed firmer and the soil surface 7. In some embodiments, a linkage is provided between the soil-engaging portion of the seed firmer and a ski or skis configured to ride along the soil surface 7 adjacent to the trench; a Hall-effect or other position sensor is disposed to detect a position of the linkage such that the sensor signal is related to the depth at which the seed firmer engages the bottom of the trench relative to the soil surface. In other embodiments, a similar sensor is used with a linkage connecting the soil-engaging portion of the seed firmer to the gauge wheel arm 54. In some embodiments, the depth sensor comprises one of the embodiments disclosed in the '591 application previously incorporated by reference.

[0038] The foregoing description is presented to enable one of ordinary skill in the art to make and use the invention and is provided in the context of a patent application and its requirements. Various modifications to the preferred embodiment of the apparatus, and the general principles and features of the system and methods described herein will be readily apparent to those of skill in the art. Thus, the present invention is not to be limited to the embodiments of the apparatus, system and methods described above and illustrated in the drawing figures, but is to be accorded the widest scope consistent with the spirit and scope of the appended claims.

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CLAIMS

1. An agricultural row unit, comprising:

a row unit frame;

a gauge wheel arm pivotally mounted to the row unit frame and disposed to limit the depth of a trench opened by the row unit; and

a sensor configured to generate a signal related to the angular position of said gauge wheel arm relative to said row unit frame.

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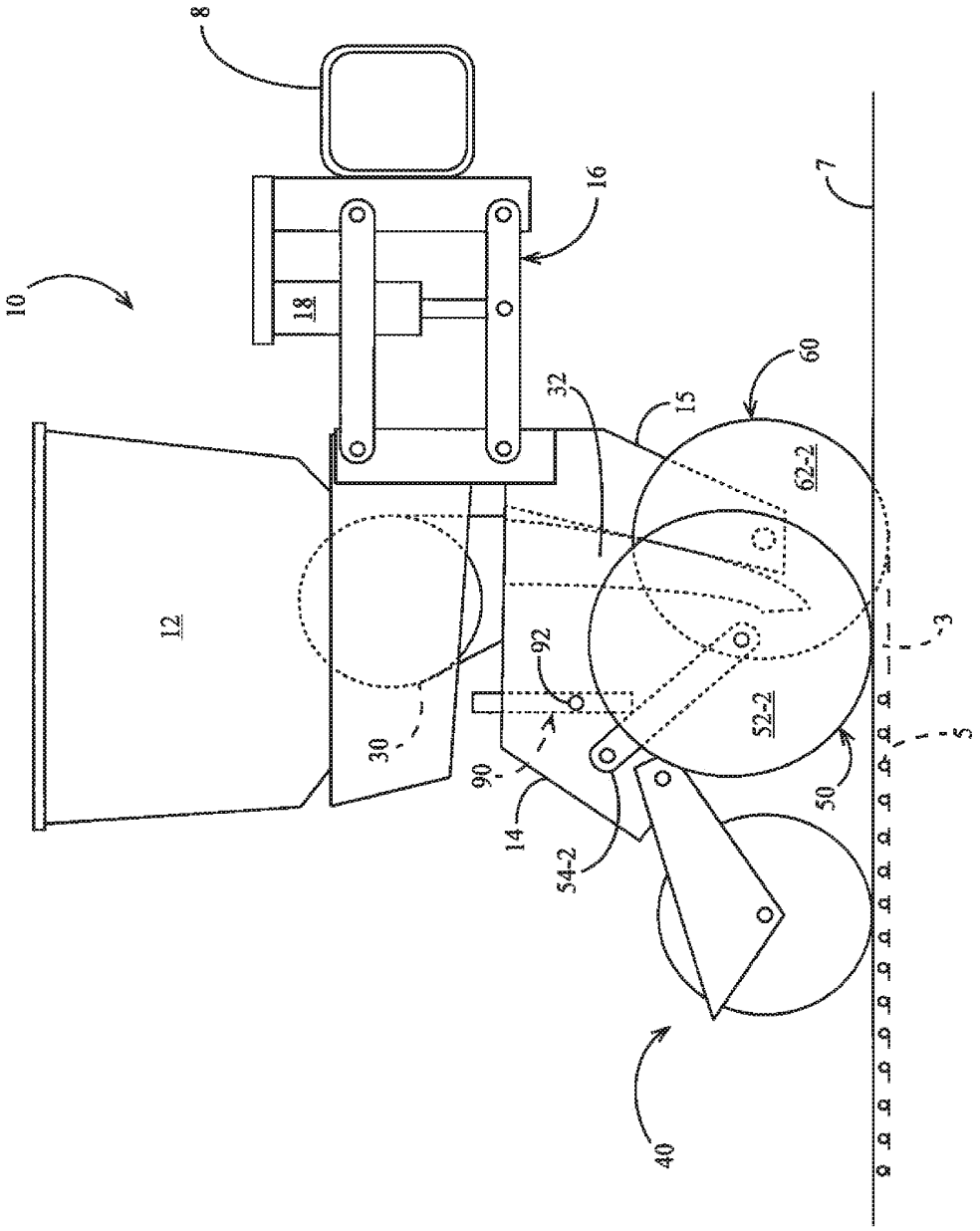


FIG. 1

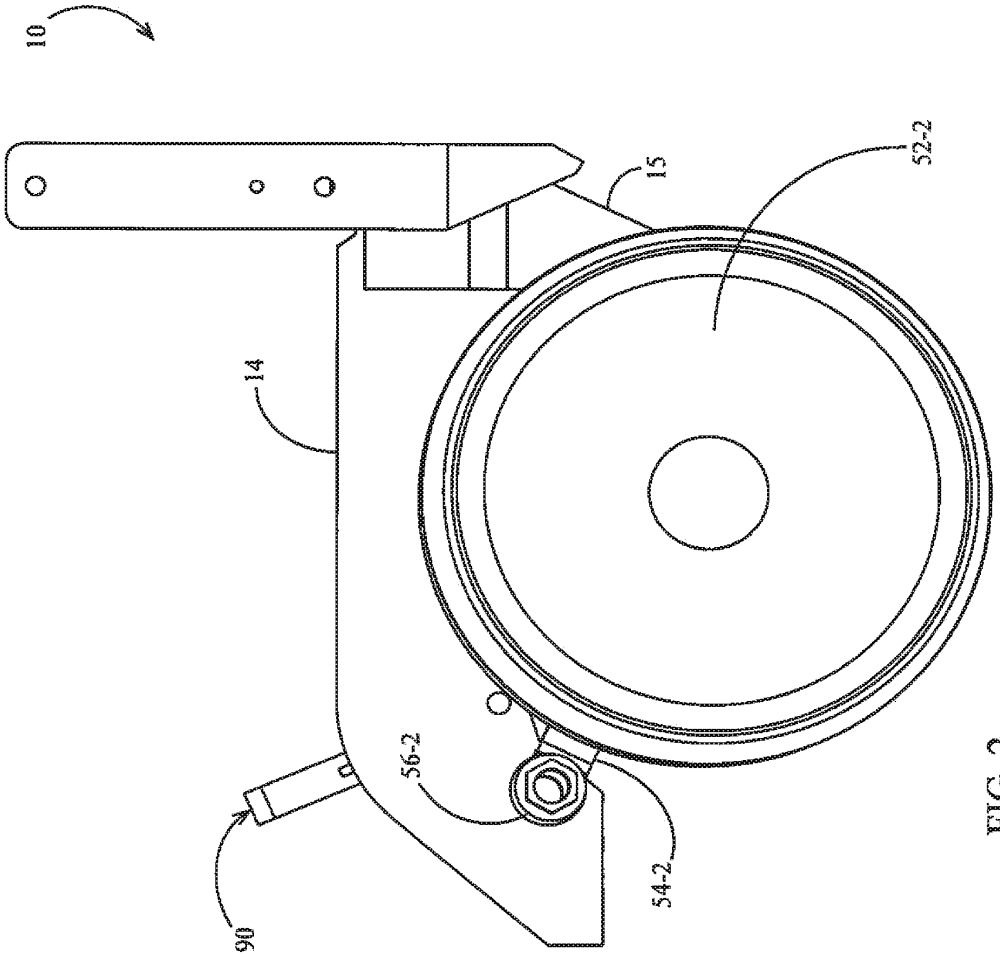


FIG. 2

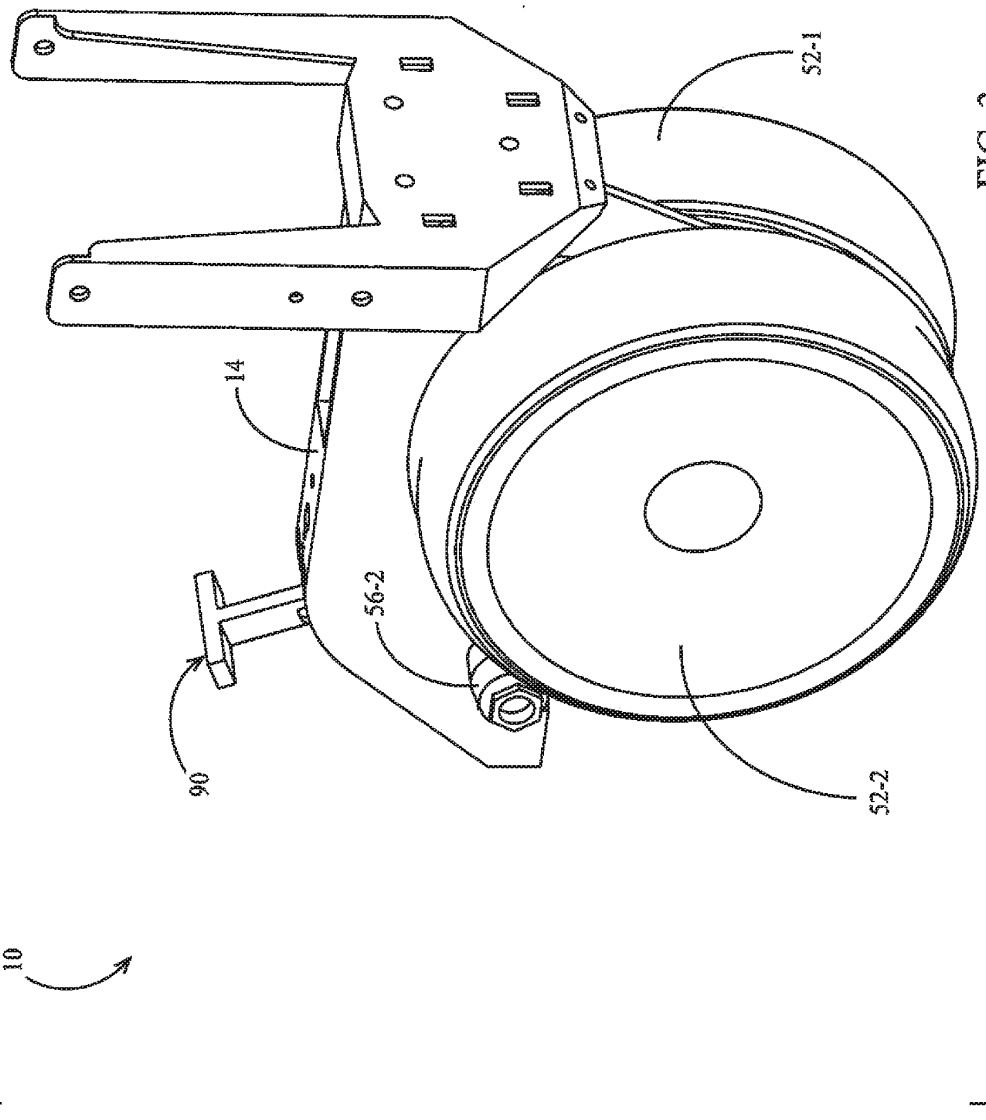


FIG. 3

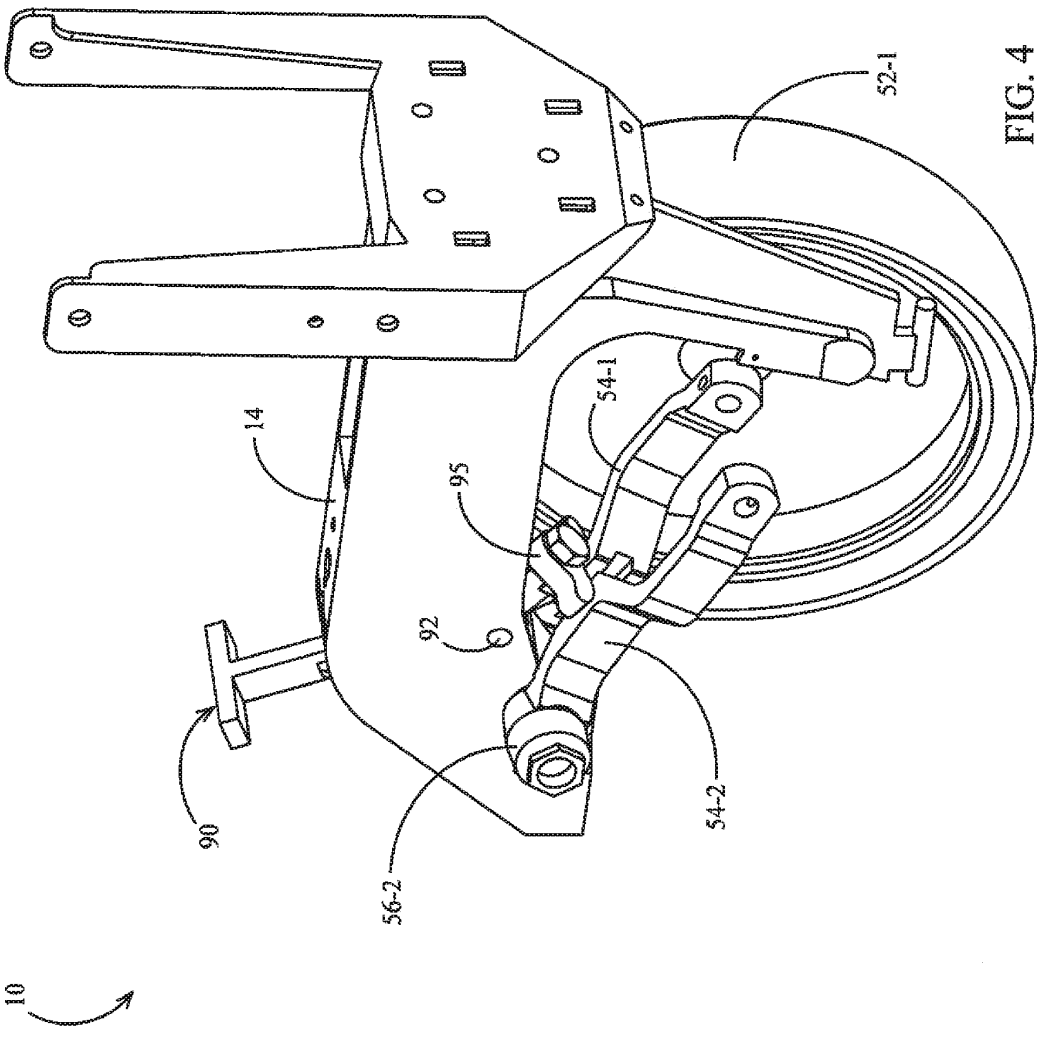


FIG. 4

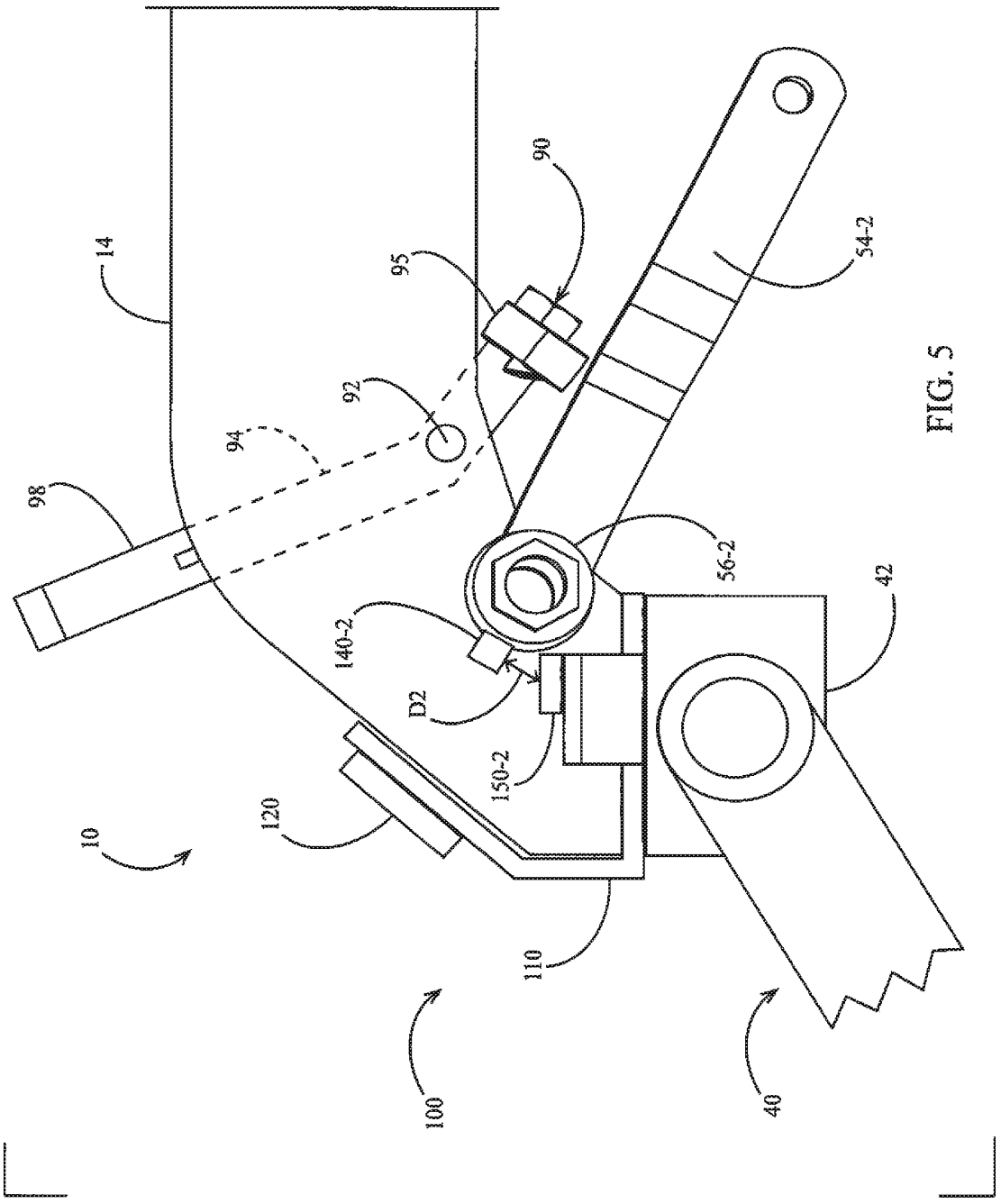


FIG. 5

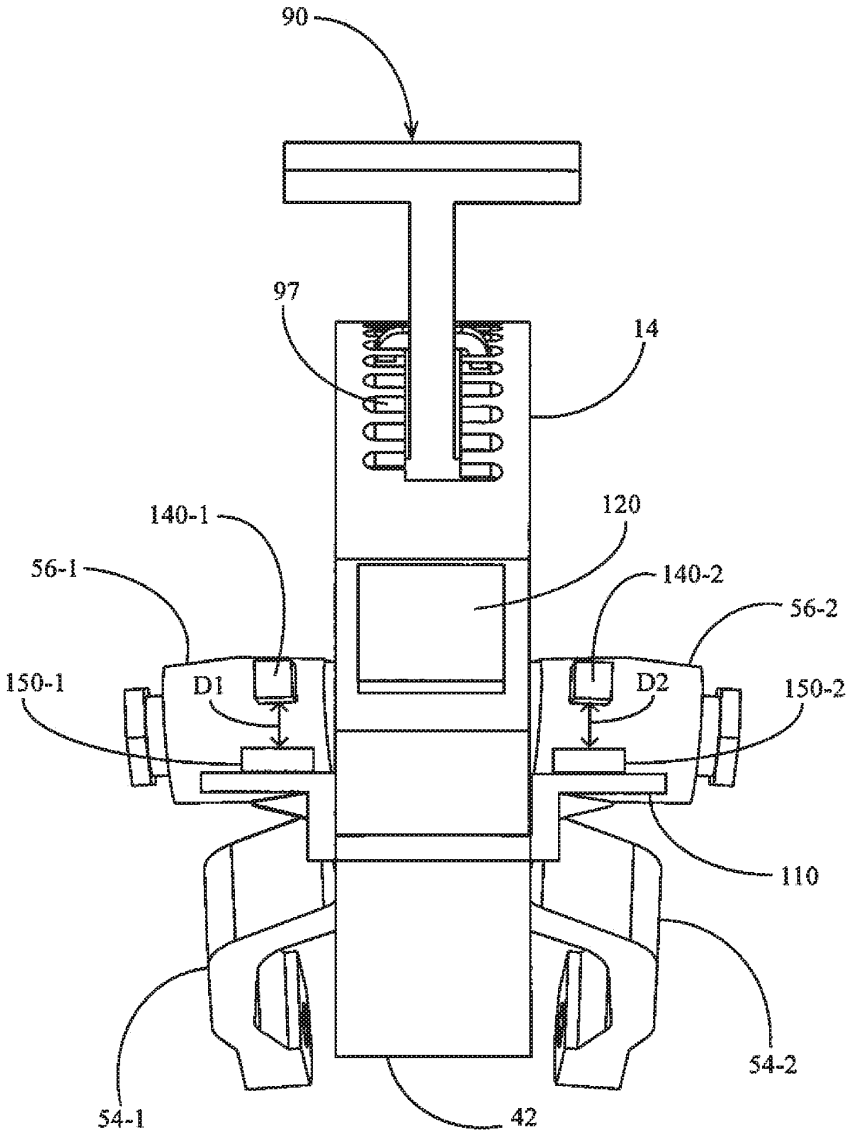


FIG. 6

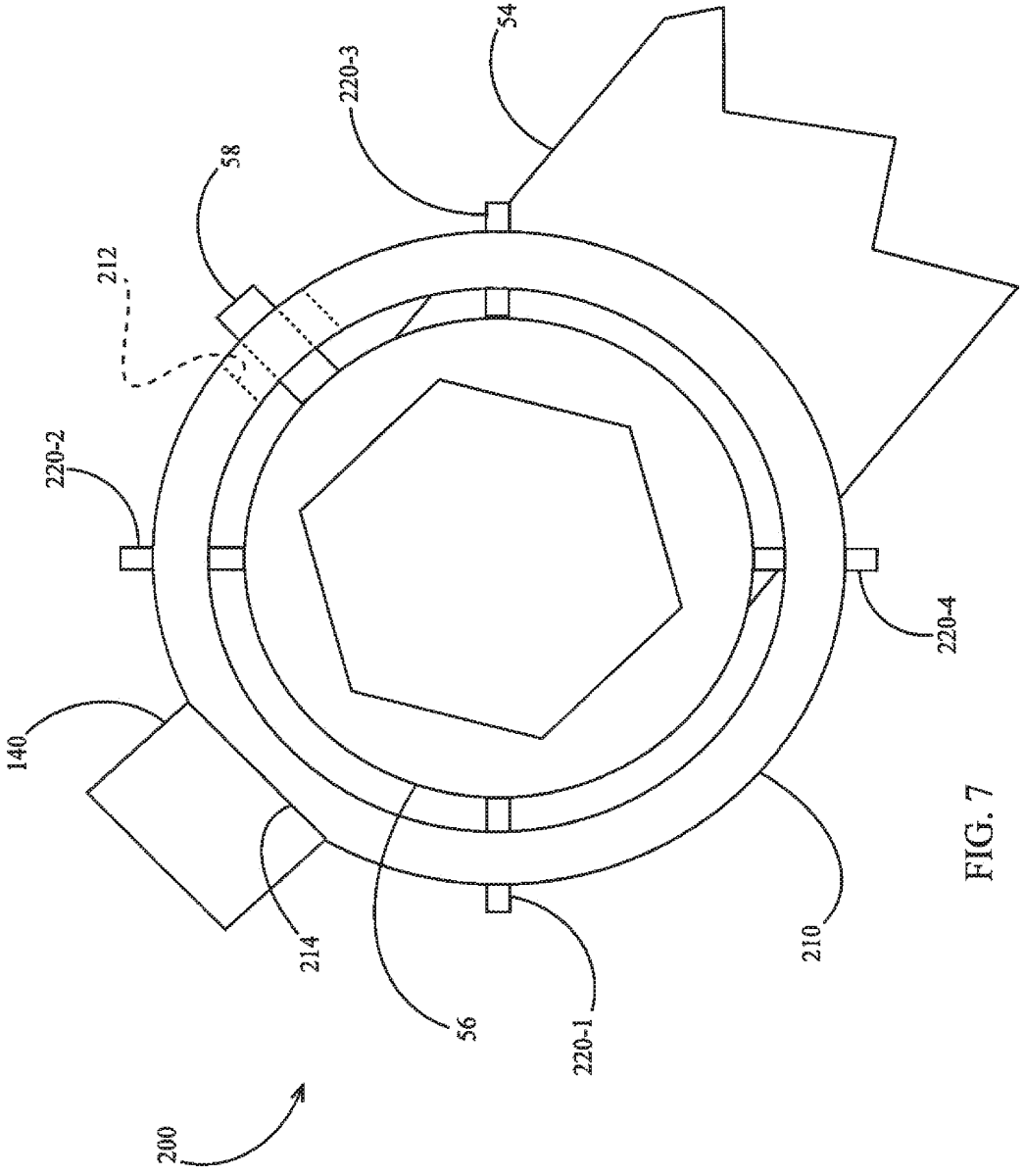


FIG. 7

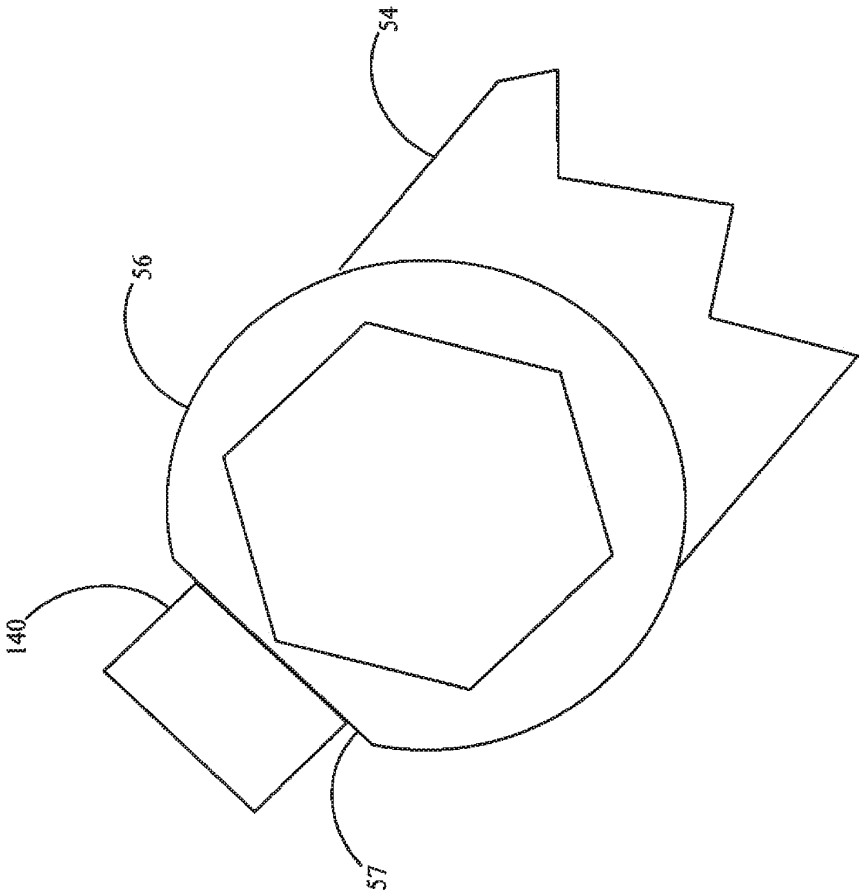


FIG. 8

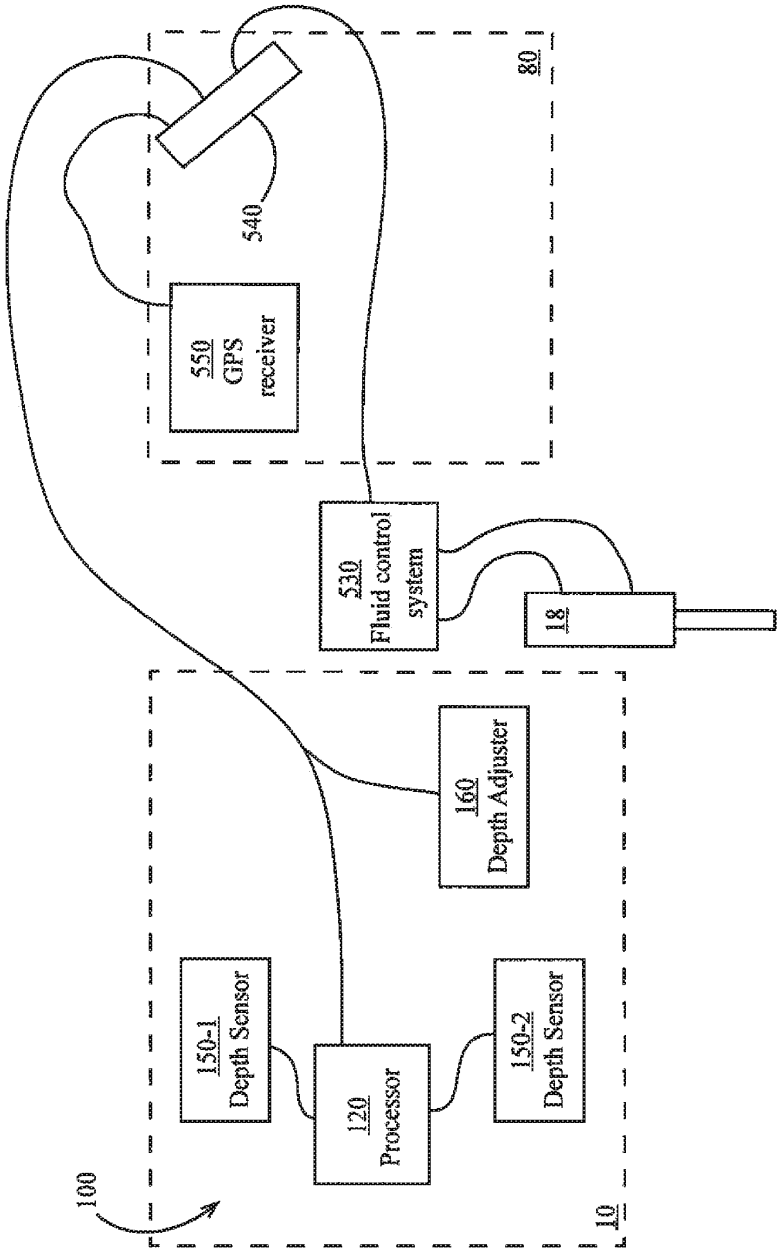

80
540
550
GPS
receiver
530
Fluid control
system
18
160
Depth Adjuster
150-1
Depth Sensor
120
Processor
150-2
Depth Sensor
100
10
500

FIG. 9

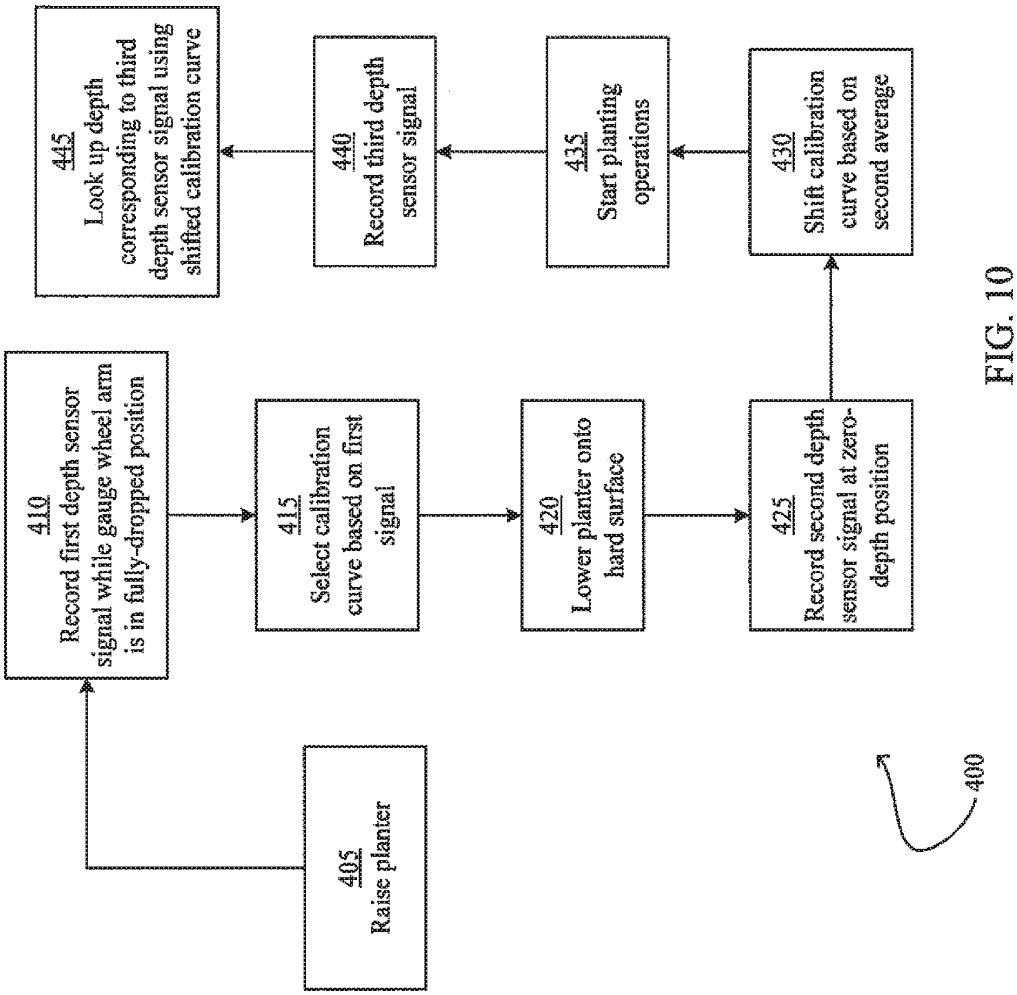

405
Raise planter
410
Record first depth sensor signal while gauge wheel arm is in fully-dropped position
415
Select calibration curve based on first signal
420
Lower planter onto hard surface
425
Record second depth sensor signal at zero-depth position
430
Shift calibration curve based on second average
435
Start planting operations
440
Record third depth sensor signal
445
Look up depth corresponding to third depth sensor signal using shifted calibration curve
400

FIG. 10

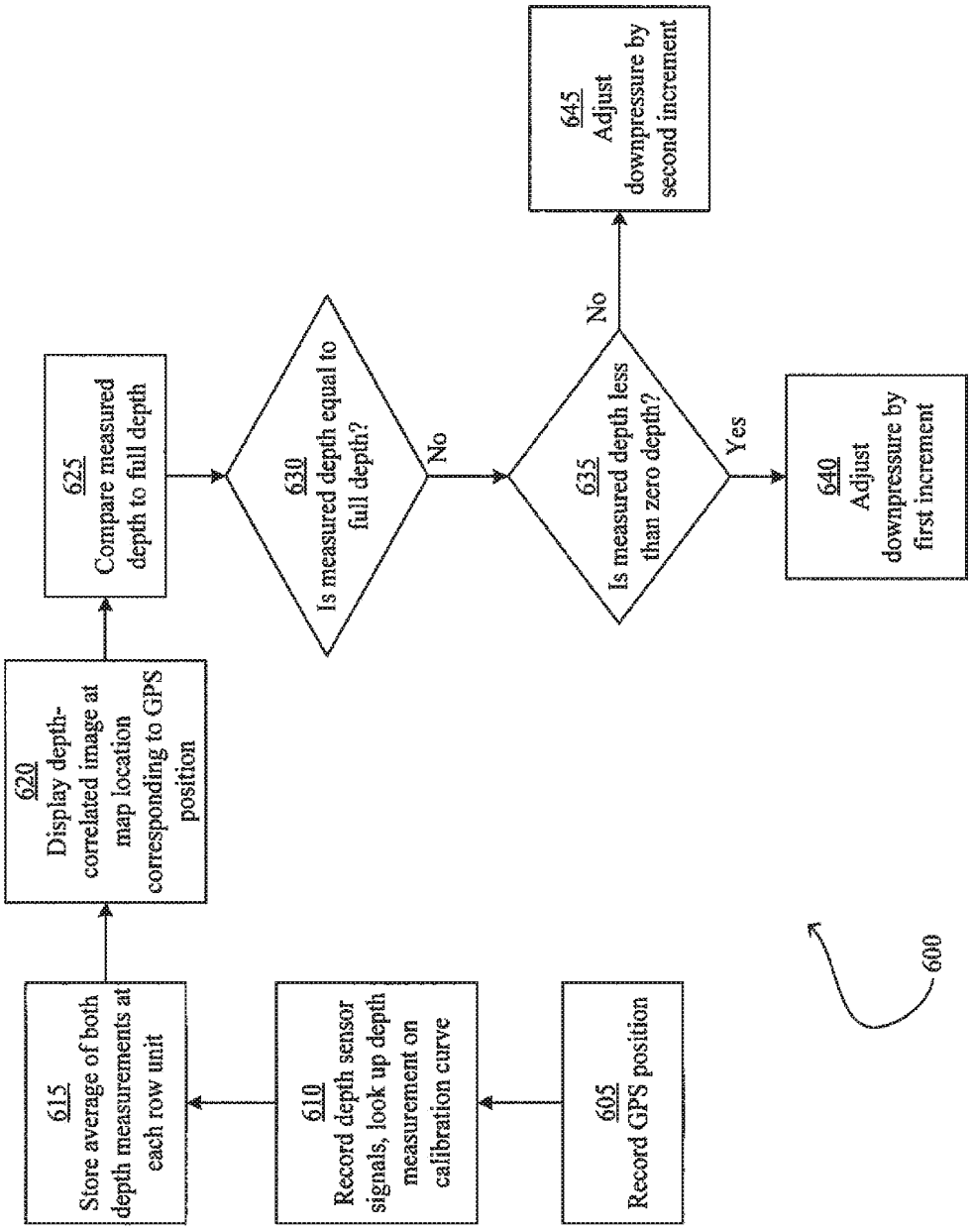

605
Record GPS position
610
Record depth sensor signals, look up depth measurement on calibration curve
615
Store average of both depth measurements at each row unit
620
Display depth-correlated image at map location corresponding to GPS position
625
Compare measured depth to full depth
630
Is measured depth equal to full depth?
No
635
Is measured depth less than zero depth?
Yes
640
Adjust downpressure by first increment
No
645
Adjust downpressure by second increment
600

FIG. 11

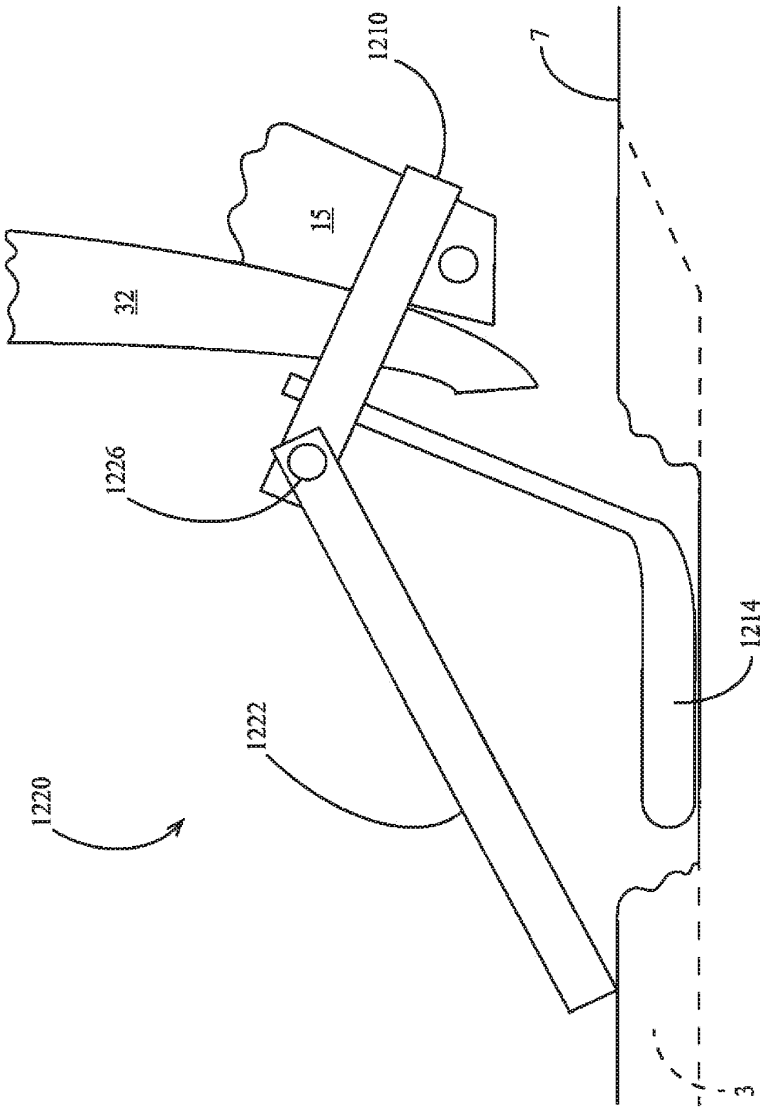


FIG. 12

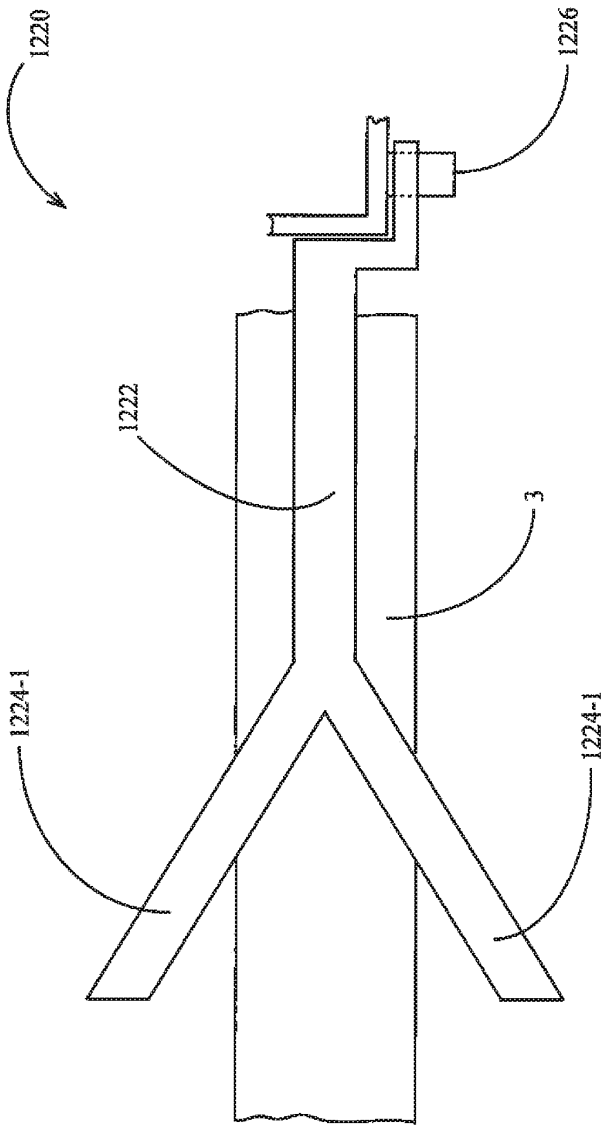


FIG. 13

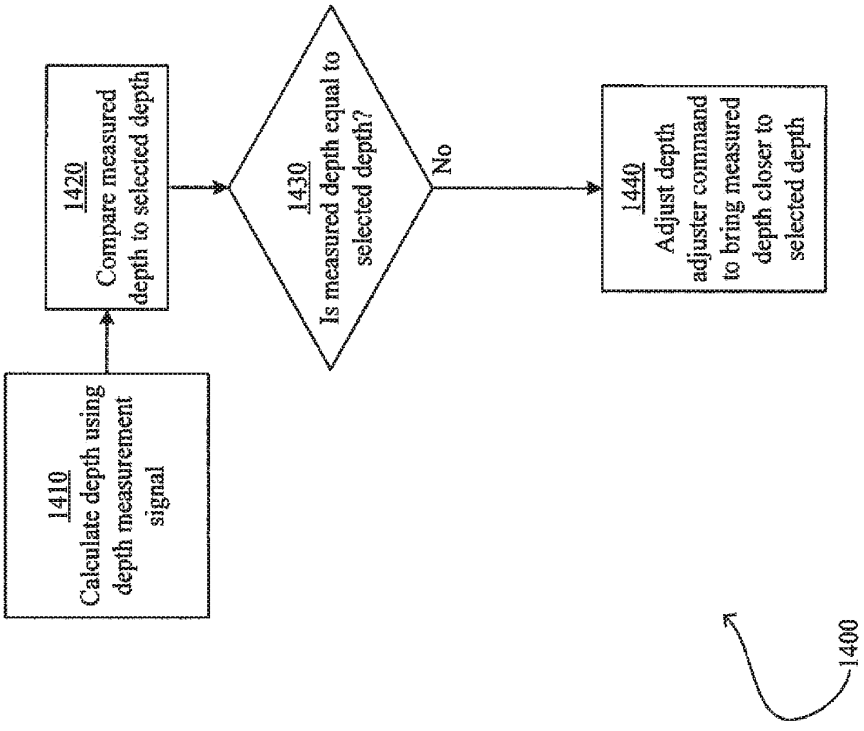

1410
Calculate depth using depth measurement signal
1420
Compare measured depth to selected depth
1430
Is measured depth equal to selected depth?
No
1440
Adjust depth adjuster command to bring measured depth closer to selected depth
1400

FIG. 14

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/066639

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - A01B 63/00 (2014.01)
USPC - 111/137
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)
IPC(8) - A01B 63/00, 63/02, 63/10, 63/16, 63/22, 63/32, 63/111; A01C 5/00, 5/04, 5/06, 5/08, 7/00 (2014.01)
USPC - 111/134, 135, 137, 926; 172/4; 701/50

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
CPC - A01B 33/087, 63/00, 63/02, 63/10, 63/16, 63/22, 63/32, 63/111; A01C 5/00, 5/06, 5/066, 5/08; Y10S 111/926 (2013.01)

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,413,685 A (GREMELSPACHER et al) 08 November 1983 (08.11.1983) entire document	1
A	US 2012/0186503 A1 (SAUDER et al) 26 July 2012 (26.07.2012) entire document	1

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"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	Date of mailing of the international search report
27 February 2014	21 MAR 2014

Name and mailing address of the ISA/US	Authorized officer:
Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (July 2009)

(11) Application No. AU 2010201330 A1

(19) AUSTRALIAN PATENT OFFICE

(54) Title
A parallelogram planter

(51)[6] International Patent Classification(s)
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A01B 63/111 63/111
(2006.01) 20060101ALI2010041
A01C 7/20 (2006.01) 4BHAU A01C
A01C 7/18 7/20
20060101AFI2010041 20060101ALI2010041
4BHAU

(21) Application No: 2010201330 (22) Application Date: 2010.04.01

(30) Priority Data

(31) Number (32) Date (33) Country
2009904339 2009.09.10 AU

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(71) Applicant(s)
A.F. Gason Pty Ltd

(72) Inventor(s)
McFarlane, Barry Keith; Carrigan, Daryl Lloyd

(74) Agent/Attorney
Davies Collison Cave, 1 Nicholson Street, Melbourne, VIC, 3000

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ABSTRACT:

A planter unit for seeding a body of soil having a soil surface is disclosed. The planter unit includes a parallelogram frame having two pairs of opposed frame members for mounting to a toolbar. It also includes a resilient member attached to the parallelogram frame for holding the frame members of the parallelogram frame in a parallelogram shape while permitting the shape of the parallelogram to alter in response to an external force. Yet further the planter unit includes a gauge wheel operatively associated with the parallelogram frame for engaging the soil surface and travelling over the soil surface in use, and a seeding arrangement pivotably mounted to the parallelogram frame at a pivot location which includes a seed dispenser that in an operative position is spaced below the pivot location. The unit also includes a biasing arrangement for biasing the seeding arrangement to an operative position whereby movement of the seeding arrangement is independent of movement of the parallelogram frame and can move in response to an external force on the seeding arrangement that overcomes the bias of the biasing arrangement.

FIG 5 FOR PUBLICATION

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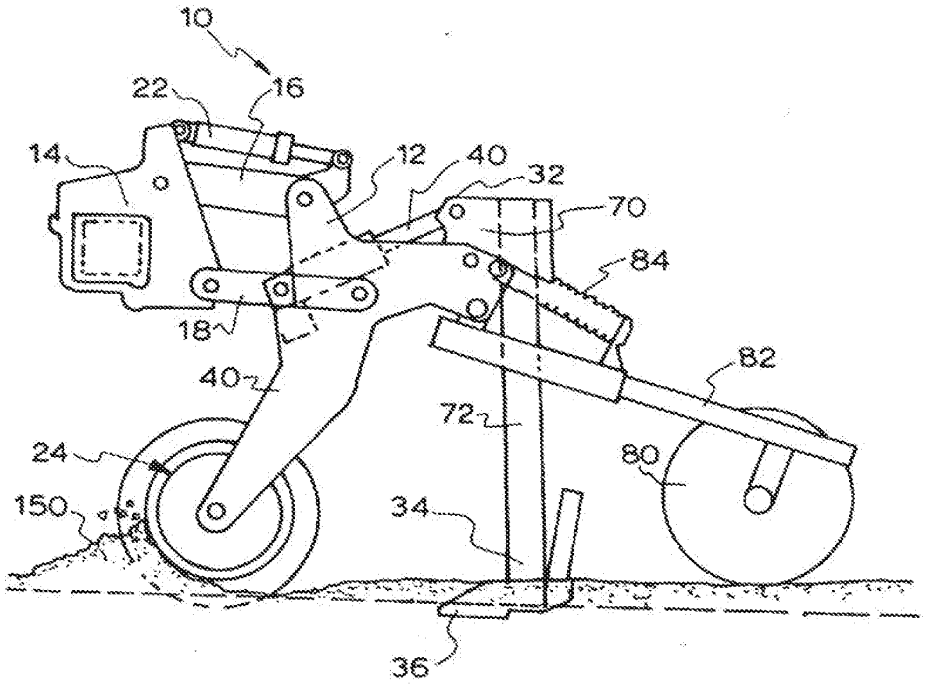


Fig.6.

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A PARALLELOGRAM PLANTER

FIELD OF THE INVENTION

This invention relates to a parallelogram planter unit. This invention extends to an apparatus for planting seed including a frame and a plurality of said parallelogram planter units.

This invention relates particularly but not exclusively to a parallelogram planter unit for use in broad acre crop farming where the surface of the land is undulating and the consistency of the soil is not necessarily even. It will therefore be convenient to hereinafter describe the invention in detail with reference to this example application. However it is to be clearly understood that the invention is not to be limited to planters that are used in broad acre farming. The invention could equally be applied to all other planters.

BACKROUND TO THE INVENTION

Crop cultivation typically involves the placement of seed in a number of rows in the soil in a field. The rows run parallel to each other the length of the field. To sow the seed, the soil needs to be broken up, the seed needs to be placed in the soil, and then the soil needs to be closed and patted down. Further the seed needs to be inserted into the soil at a desired depth to foster germination of the seed and optimize crop growth.

A contrivance known as a parallelogram planter has been used for carrying out this planting process in broadacre crop cultivation for at least twenty years. A parallelogram planter comprises a parallelogram that is mounted to a toolbar of a frame. The parallelogram comprises two spaced uprights and two vertically spaced arms that are pivotally mounted to the uprights. Thus the members can pivot relative to each other and do not firm a fixed and rigid structure.

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The parallelogram is held in a certain parallelogram shape by a resilient biasing member, such as a spring. The resilient biasing member permits the parallelogram to change its shape in response to external forces. Specifically the shape of the parallelogram can adjust in response to these external forces by moving to a more upright shape or moving to a more flattened shape.

A gauge wheel is mounted on the parallelogram and extends down from it to engage the soil. The parallelogram forces the gauge wheel downward to engage the surface of the soil with a certain force.

The strength of the resilient biasing member determines the force with which the gauge wheel pressed downwardly against the surface of the soil. The biasing member thus determines the position or height that the gauge wheel adopts relative to the surface of the soil when it is displaced across this surface. Put another way it influences the engagement of the gauge wheel with the surface of the soil. While the parallelogram forces the gauge wheel downward into engagement with the surface of the soil, it is capable of changing shape and therefore does permit some movement of the gauge wheel in response to an external force.

The planter unit also includes a seeding arrangement mounted on the parallelogram and depending downwardly therefrom. The seeding arrangement is held in a downwardly directed orientation by the parallelogram in the same way that the gauge wheel is held down. The seeding arrangement is mounted rearward of the gauge wheel relative to the direction of travel of the planter unit. The seeding arrangement includes a seed dispenser at its lower end for discharging seed into the soil at the appropriate soil depth. The seed dispenser at the lower end of the seeding arrangement can be a tyne or a double disc opener or a chisel plow type.

In the parallelogram planter the seed dispenser, e.g. the tyne, and the gauge wheel are mounted effectively to the same upright of the parallelogram and this

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upright is referred to as the primary mounting. Thus their movement is linked together and they do not move independently of each other.

The seed dispenser has an adjustable height whereby to deliver the seed to a desired soil depth, it being recognized that different crops are seeded at different depths for obtaining an optimal yield.

The depth of the seed dispenser is measured from or is set relative to the surface of the gauge wheel. This flows from the idea that the gauge wheel is designed to follow the surface of the soil and accommodate for undulations in the soil. Thus if the surface rises, the gauge wheel will be caused to rise, and the seed dispenser which is set at a specific depth relative to the gauge wheel and follows changes in vertical height of the gauge wheel will also undergo a corresponding rise. This way the seed is dispensed into the soil at the same depth irrespective of undulations in the soil surface. The insertion of seed into the soil at a constant depth along the length of an undulating field is important to achieve effective germination rates for crops and high crop yields.

The planter unit further includes a press wheel that trails behind the tyne for closing the soil opening and patting down the soil after the seed had been delivered into the soil. The press wheel bears down on the soil with a small force and is capable of movement independently of the tyne and the gauge wheel.

A development on this basic planter unit is the Janke planter which was designed and sold by Janke Australia based in Mount Tyson Queensland. The Janke planter has a resilient parallelogram member that is in the form of a jump cylinder that is a hydraulic cylinder extending between the two uprights of the parallelogram. The pressure in the hydraulic jump cylinder presses the gauge wheel and the tyne operatively downward to perform their functions as described above. However with the Janke planter the hydraulic pressure is effectively preset or predetermined and is not operator adjustable.

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Instead the Janke planter has a linear actuator for adjusting the position or orientation of the hydraulic jump cylinder within the parallelogram during operation thereof. The adjustment of the position of the hydraulic cylinder in the parallelogram has the effect of altering the shape of the parallelogram and thereby raising or lowering the height of the gauge wheel. It can therefore be used to adjust the height of the gauge wheel.

Thus if an operator notices that the gauge wheel is bulldozing or skipping they can adjust the position of the jump cylinder using the manual adjustment of the linear actuator on planter unit. This achieves an effective lengthening or an effective shortening of the jump cylinder as the case may be and this effects a raising or lowering of the gauge wheel, e.g. to address the bulldozing or skipping thereof.

However this adjustment does require manual adjustment of the linear actuator by an operator, e.g. by rotating a nut on a screw threaded shank. Further each planter unit on the frame needs to be manually adjusted. As there are usually many planter units on a frame, each adjustment will be a time consuming and arduous process. Thus it would simply not be practical to manually adjust the unit on a single traverse along the length of a field for example. The position of the jump cylinder and thereby the pressure on the gauge wheel could be changed a few times a day, but realistically not more than this. The setting that is adopted therefore reflects a compromise of what appears to work best in a given set of conditions.

Another potential shortcoming of the Janke planter is that if the tyne encounters resistance as it is displaced in a forward direction through the soil it has limited ability to yield to this resistance. For example if the tyne which is submerged in the soil, gets caught behind a root or log within the soil, it has limited ability to respond to this obstacle. It can move upwardly to some extent, by moving the parallelogram to a more upright position through the hydraulic cylinder. However it cannot pivot rearwardly because its movement is tied to a change in shape of the

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parallelogram and the structure does not permit such a movement. Consequently there is a risk that the tyne could either be damaged or broken.

Clearly it would be advantageous if a planter unit could be devised that ameliorated at least some of the shortcomings of the prior art planter units described above. More specifically it would be advantageous if a contrivance could be devised to enable the height of the gauge wheels to be adjusted on a frame in response to skipping or bull dozing more easily. It would also be advantageous if a contrivance could be devised that permitted the tyne to move independently of the parallelogram to enable it to yield in response to an external force and thereby reduce the risk of damaging or breaking the tyne.

SUMMARY OF THE INVENTION

According to one aspect of the invention there is provided a planter unit for seeding a body of soil having a soil surface including:

a parallelogram frame having two pairs of opposed frame members for mounting to a toolbar;

a resilient member attached to the parallelogram frame for holding the frame members of the parallelogram frame in a parallelogram shape while permitting the shape of the parallelogram to alter in response to an external force;

a gauge wheel operatively associated with the parallelogram frame for engaging the soil surface and travelling over the soil surface in use;

a seeding arrangement pivotably mounted to the parallelogram frame at a pivot location which includes a seed dispenser that in an operative position is spaced below the pivot location; and

a biasing arrangement for biasing the seeding arrangement to an operative position whereby movement of the seeding arrangement is

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independent of movement of the parallelogram frame and thus the seeding arrangement is movable relative to the parallelogram frame in response to an external force on the seeding arrangement that overcomes the bias of the biasing arrangement.

The one pair of opposed parallelogram frame members may be broadly upwardly extending. One of the upwardly extending frame members may be a primary mounting and the other upwardly extending frame member may be a toolbar mounting, e.g. for mounting the parallelogram frame to a toolbar.

The other pair of opposed parallelogram frame members may be broadly horizontally extending. One of the horizontally extending parallelogram frame members may be an upper arm. The other horizontally extending parallelogram frame member may be a lower arm.

The resilient parallelogram member may extend between the primary mounting and the toolbar mounting.

The biasing arrangement may permit the seeding arrangement to pivot rearward in response to it encountering resistance when being displaced in a forward direction, e.g. independently of any movement of the gauge wheel on the parallelogram frame.

Thus the seeding arrangement may be pivotally mounted on one of the parallelogram frame members. This enables it to pivot independently relative to the parallelogram, free of any corresponding change in the shape of the parallelogram, e.g. in a rearward direction, to relieve resistance encountered by trash in the soil at it moves through the soil.

The biasing arrangement is independent of the parallelogram and the pivoting movement of the seeding arrangement occurs independently of extension or

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retraction of the resilient parallelogram member. Thus the seeding arrangement is able to move quite independently of the gauge wheel.

The gauge wheel may be operatively connected, e.g. rigidly, to the parallelogram frame member that is the primary mounting.

The seeding arrangement may be pivotally mounted to the parallelogram frame member that is the primary mounting.

The biasing arrangement may comprise a resilient biasing member having one end that is coupled to the seeding arrangement and another end that is mounted to one of the frame members of the parallelogram frame which may be the toolbar mounting or the primary mounting.

The resilient biasing member may be a hydraulic cylinder, e.g. a hydraulic cylinder. Instead the resilient biasing member may be a spring, e.g. a coil spring or a pneumatic cylinder.

The resilient parallelogram member may be a jump cylinder that is a hydraulic cylinder. The hydraulic cylinder may be pressurized at a hydraulic pressure of up to 1200psi (8272.8 kPa), e.g. the jump cylinder may be pressurised at a hydraulic pressure of up to 1800psi (12409.2 kPa).

In one form the resilient parallelogram member may be positioned outside of the parallelogram frame and adjacent to the parallelogram frame. For example the resilient member may extend operatively between said primary and toolbar mountings above said upper arm of the parallelogram frame.

Instead in another form the resilient member is received within the parallelogram frame and extends between the primary and toolbar mountings between the upper and the lower arms of the parallelogram frame.

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The planter unit may include a pressure adjuster for adjusting the pressure within the hydraulic cylinder forming the resilient parallelogram member to adjust the effective length thereof.

The hydraulic cylinder may comprise a piston that is displaceable within a housing of the cylinder. That is the pressure can be increased to displace the piston out of the cylinder housing to lengthen the hydraulic cylinder. Similarly the pressure can be reduced to retract the piston within the cylinder housing to shorten the overall length of the hydraulic cylinder. The hydraulic jump cylinder may have an adjuster to enable the pressure within the hydraulic cylinder to be adjusted, e.g. to adjust the effective length thereof.

The planter may include a jump cylinder controller for remotely adjusting the effective length of the jump cylinder by adjusting the pressure in the jump cylinder.

The jump cylinder controller may include a hydraulic circuit that is operatively coupled to the jump cylinder that permits the hydraulic pressure applied to the jump cylinder to be increased or decreased from a point along the circuit that is remote from the jump cylinder.

The controller may include an operator control at a remote operator position for increasing or decreasing the pressure. The operator control may include one or more levers that can be manually operated by an operator at the operator position. In use the remote operator position may be on a vehicle that is used to tow a frame, to which the planter unit is mounted, around a paddock.

The hydraulic circuit may include hydraulic hoses extending from the hydraulic cylinder to the operator location. The hydraulic circuit may include an accumulator, e.g. in the form of an accumulator bottle, operatively coupled thereto.

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The planter unit may include a fork extending in a downward direction away from said primary mounting and the gauge wheel may be mounted on the fork towards a lower end thereof. Conveniently the fork may be integrally formed with the primary mounting such that it is essentially an extension thereof.

The gauge wheel may have a broadly cylindrical ground engaging wheel body for running along the surface of the ground. The wheel body may have a rubber or rubber like surface for engaging the surface of the soil.

The gauge wheel may also include a disc of greater diameter than the wheel body mounted thereon, that projects radially out beyond the surface of the wheel body. The function of the disc is to penetrate the soil that is to be seeded thereby to clear the way for the seed dispenser to travel through the soil at the seed insertion depth. Thus the disc opens up the soil and cut the stubble and trash that helps to maintain the correct seed depth and reduce hair pinning.

The disc may be mounted intermediate the sides of the wheel body, e.g. midway between the sides of the wheel body. The disc may be a Coulter disc, e.g. of steel, and the disc may have a diameter of up to 500mm.

The seeding arrangement may include a shank support that is pivotally mounted to the primary mounting and a shank which is adjustably mounted on the shank support.

The shank support has an upper end that forms the upper end of the seeding arrangement and the shank has a lower end that forms the lower end of the seeding arrangement.

The seeding arrangement may include a seed dispenser mounted on said shank towards said operatively lower end thereof. The seed dispenser may include a tyne. Instead the seed dispenser may include a double disc opener. Yet further the seed dispenser may be in the form of a chisel plough which is also often

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referred to as a chisel plow. Yet even further the seed dispenser may be in the form of a sweep.

The seeding arrangement may include a seed depth adjuster for adjusting the depth at which seed is dispensed into the soil during operation.

The seed depth adjuster enables the shank to be checked in any one of a plurality of positions within the shank support whereby to adjust the depth of the seed dispenser within the soil.

The seed depth adjuster enables the vertical position of the seed dispenser relative to the surface of the gauge wheel to be effectively set, and provided that the gauge wheel is positioned on the surface of the soil, as it is designed to do, the seed dispenser dispenses seed into the soil at the depth setting at which the seed depth adjuster has been set.

The planter unit may further include a press wheel arm and a press wheel rotatably mounted on the press wheel arm. The press wheel arm may be may be pivotally mounted to the primary mounting, e.g. at an end thereof that is remote from the press wheel.

The planter unit may further include press wheel biasing means for biasing the press wheel towards a position in which it runs along the surface of the ground but also permits the press wheel to be pivoted upwardly in response to an external force. The press wheel biasing means may be in the form of a spring, e.g. a coil spring, for urging the press wheel down against the surface of the soil.

The toolbar mounting may include a mounting formation for mounting the planter unit to a toolbar. The mounting formation may include a toolbar engaging formation that is shaped to complement the toolbar for receiving the toolbar therein, and a bracket for extending around the toolbar and mounting it to the toolbar mounting.

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The primary mounting may include an upright section and also a trailing section extending transversely away from the upright section. The fork may project away from the upright section and the upper and lower arms may be pivotally mounted to the upright section. The seeding arrangement may be pivotally mounted to the trailing section, and the press wheel arm may be mounted to the trailing section.

Further the planter unit may optionally also include a mud scraper mounted on the fork for scraping mud and debris off the gauge wheel as it rotates past the scraper.

According to another aspect of this invention there is provided a planter unit for seeding a body of soil having a soil surface, including:

a parallelogram frame having two pairs of opposed frame members for mounting to a toolbar;

a resilient member attached to the parallelogram frame for holding the frame members of the parallelogram frame in a parallelogram shape while permitting the shape of the parallelogram to alter in response to an external force;

a gauge wheel operatively associated with the parallelogram frame for engaging the soil surface and travelling over the soil surface in use;

a seeding arrangement attached to the parallelogram frame which includes a seed dispenser that in an operative portion is received in the soil in use to deliver seed into the soil and

control means for controlling movement of the resilient member and hence movement of the gauge wheel from a remote location.

The resilient member may be a hydraulic cylinder extending between opposed frame members of the parallelogram frame and said control means is a controller spaced from the hydraulic cylinder for enabling an operator to control the hydraulic

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pressure in the hydraulic cylinder and thereby the extension or retraction of the hydraulic cylinder from a remote location.

In this aspect of the invention the planter unit may include a biasing arrangement for biasing the seeding arrangement towards the operative position, but which permits the seeding arrangement to be pivoted relative to the parallelogram in response to an external force on the seeding arrangement that overcomes the bias of the biasing arrangement. Specifically the biasing arrangement may permit the seeding arrangement to pivot rearward in response to it encountering resistance when being displaced in a forward direction.

In this aspect of the invention the seeding arrangement may be rigidly mounted to the parallelogram frame whereby to permit the seeding arrangement to move together with the parallelogram in response to an external force, e.g. but not independently thereof.

The resilient member may include a jump cylinder as described above. The control means may be in the form of a controller for remotely adjusting the effective length of the jump cylinder by adjusting the pressure in the jump cylinder. The controller is positioned remote from the jump cylinder whereby to enable the operator to adjust the hydraulic pressure remotely.

The jump or hydraulic cylinder may comprise a piston that is displaceable within a cylinder housing. That is the pressure can be increased to displace the piston out of the cylinder housing to lengthen the hydraulic cylinder. Similarly the pressure can be reduced to retract the piston within the cylinder housing to shorten the overall length of the hydraulic cylinder.

The controller may include a hydraulic circuit that is operatively coupled to the jump cylinder that permits the hydraulic pressure applied to the jump cylinder to be increased or decreased from a point along the circuit that is remote from the jump cylinder.

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The controller may include an operator control at a remote operator position for increasing or decreasing the pressure. In use the remote operator position may be on a vehicle that is used to a frame to which the planter unit is mounted around a paddock. The operator control may include one or more levers that can be manually operated by an operator at the remote operator position.

The hydraulic circuit may include hydraulic pipes extending from the hydraulic cylinder to the remote operator position. The hydraulic circuit may include an accumulator, e.g. in the form of an accumulator bottle, operatively coupled thereto.

The planter unit may include any one or more of the other optional features of the planter unit described in the first aspect of the invention above.

The one pair of opposed parallelogram sides may be broadly upwardly extending. One of the upwardly extending sides may be a primary mounting and the other upwardly extending side may be a toolbar mounting, e.g. for mounting the parallelogram to a toolbar.

The other pair of opposed parallelogram sides may be broadly horizontally extending and may comprise an upper arm and a lower arm.

The resilient parallelogram member may extend between the primary mounting and the toolbar mounting, and the gauge wheel and the seeding arrangement may be operatively coupled to the primary mounting.

In one form the resilient parallelogram member may be positioned outside of the parallelogram and adjacent to the parallelogram. Instead in another form the tensioning member may be received within the parallelogram and extends between the primary and toolbar mountings between the upper and the lower arms of the parallelogram.

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According to another aspect of this invention there is provided a planter unit for seeding a body of soil having a soil surface including for:

a parallelogram frame having two pairs of opposed frame members for mounting to a toolbar;

a resilient member attached to the parallelogram frame for holding the frame members of the parallelogram frame in a parallelogram shape while permitting the shape of the parallelogram to alter in response to an external force;

a gauge wheel operatively associated with the parallelogram frame for engaging the soil surface and travelling over the soil surface in use;

a seeding arrangement attached to the parallelogram frame which includes a seed dispenser that in an operative portion is received in the soil in use to deliver seed into the soil and

control means for

(i) controlling operation of the resilient member and hence movement of the gauge wheel; and

(ii) controlling operation of the biasing arrangement and thus vary the degree of bias applied to the seeding arrangement.

The planter units may include any one or more of the optional or preferred features of the planter unit defined or described in any one of the preceding aspects of the invention.

According to yet another aspect of this invention there is provided a method of operation of a planter unit which includes the step of controlling from a remote location operation of a resilient member attached to a parallelogram frame of the planter unit so as to control movement of a gauge wheel attached to the

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parallelogram frame for varying the depth of the gauge wheel in soil being traversed by the planter unit.

The method may include a further step of controlling from a remote location operation of a biasing means associated with a seeding arrangement of the planter unit whereby bias applied to the seeding arrangement is varied.

The planter units may include any one or more of the optional or preferred features of the planter unit defined or described in any one of the preceding aspects of the invention.

According to yet another aspect of this invention there is provided an apparatus for planting seed in a number of rows simultaneously which includes:

a frame; and

a plurality of planter units as defined in any one of the preceding aspects of the invention attached to the frame.

The frame may have at least one transverse toolbar, preferably a plurality of transverse extending toolbars, e.g. three transverse toolbars.

The frame may be supported on one or more front wheels in the form of castors forward of the toolbars. The frame may also be supported by one or more rear wheels rearward of the toolbars.

The planters may be spaced apart along the length of each transverse toolbar, e.g. at even spacing apart from each other along the length of each toolbar.

The position of the planters on each toolbar is such that they are offset relative to the planter units on the other toolbars.

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The frame may be in the form of an open frame, and the frame may have a central section, and wing sections laterally disposed on each side of the central section. Each lateral section may be able to pivot relative to the central section.

The apparatus may include a controller for enabling an operator to operatively adjust the pressure in the jump cylinders associated with the parallelograms from a remote controller point.

The controller may include a hydraulic circuit that is operatively coupled to a plurality of jump cylinders associated with the parallelograms. Optionally the hydraulic circuit may be operatively coupled to all of the jump cylinders whereby to enable an operator to adjust all of said jump cylinders together.

The controller may include a central operator control for all planter units, for enabling an operator to adjust all jump cylinders simultaneously from the central operator position. The apparatus may include a towing vehicle, e.g. a tractor, and the central operator control may be located on the towing vehicle.

The central operator control may include a single lever for adjusting the hydraulic pressure in the hydraulic circuit and thereby all the jump cylinders simultaneously. A movement of the single lever in one direction increases the hydraulic pressure and movement of the lever in the other direction increases the pressure.

The hydraulic circuit may include manifold hydraulic pipes extending along the transverse toolbars and branch pipes, e.g. in the form of flexible hoses, extending from a junction with the manifold pipes to each of the planter units.

The controller may also include an accumulator bottle operatively coupled to the hydraulic circuit.

The hydraulic circuit may further include main hydraulic pipes that extend from the main pipes to the central operator control.

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The frame may include a draw pole for operatively coupling the frame to a tow hitch of a towing vehicle having motive power, e.g. a tractor.

The controller may include a further hydraulic circuit for enabling an operator to remotely control the pressure in the hydraulic cylinders associated with the seeding arrangement for permitting the seeding arrangements to pivot independently of the parallelogram.

The further hydraulic circuit may enable an operator to control the hydraulic cylinders associated with the seeding arrangements of all of the planter units simultaneously.

The planter units may include any one or more of the optional or preferred features of the planter unit defined or described in any one of the preceding aspects of the invention.

The invention extends to a planter unit for seeding a body of soil having a soil surface, including:

a parallelogram comprising two pairs of opposed parallelogram sides for mounting to a toolbar;

a jump cylinder that is a hydraulic cylinder extending between two opposed members of the parallelogram for holding the parallelogram sides in a parallelogram shape while permitting the shape of the parallelogram shape to alter in response to an external force, wherein the jump cylinder can be extended or retracted by adjustment of the hydraulic pressure;

a controller spaced from the jump cylinder for enabling an operator to control the hydraulic pressure in the jump cylinder and thereby the extension or retraction of the jump cylinder, from a position spaced away from the controller;

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a gauge wheel operatively and rigidly mounted on a parallelogram side for engaging the soil surface and thereby following the soil surface as it travels over the soil surface, wherein the height of the gauge wheel is adjusted by extension or retraction of the jump cylinder; and

a seeding arrangement that is mounted to a parallelogram side, the seeding arrangement including a seed dispenser that in an operative position is received in the soil in use to deliver the seed into the soil.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A planter unit or row unit and an apparatus for planting seed in accordance with the invention may manifest itself in a variety of forms. It will be convenient to hereinafter describe in detail several preferred example embodiments of the invention with reference to accompanying drawings. The purpose of providing this detailed description is to instruct persons having an interest in the subject matter of the invention how to carry the invention into practical effect. However it is to be clearly understood that the specific nature of this detailed description does not supersede the generality of the preceding broad description. In the accompanying diagrammatic drawings:

Fig 1 is a three dimensional view of a planter unit in accordance with one embodiment of the invention;

Fig 2 is a front view of the planter unit of Fig 1;

Fig 3 is an end view of the planter unit of Fig 1;

Fig 4 is a top plan view of the planter of Fig 1;

Fig 5 is a front view of a planter unit in accordance with another embodiment of the invention;

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Fig 6 is a schematic front view of a planter unit similar to that in Fig 5 in which the gauge wheel is bulldozing or ploughing in the soil below its desired depth;

Figs 7 and 8 are schematic front views of the planter unit of Fig 6 in which the gauge wheel is skipping across the soil above its desired depth and is controlled;

Fig 9 is a schematic front view of the planter unit of Fig 5 showing a situation where the seed dispenser which is a tyne has encountered resistance in the soil and showing how the biasing arrangement associated with the seed dispenser accommodates this resistance;

Fig 10 is a top plan view of an apparatus for planting seed in accordance with one embodiment of the invention including a plurality of planters as shown in Figure 1;

Fig 11 is a schematic side view of the apparatus of Fig 10 in use in a field being towed by a tractor; and

Fig 12 is a top plan view of the apparatus of Fig 10 (with some details omitted for clarity) showing the controller for controlling the pressure applied to the parallelogram cylinder for setting the height of the gauge wheel.

In Figures 1 to 4 reference numeral 10 refers generally to a planter unit or a row unit in accordance with the invention.

The planter unit or row unit 10 comprises broadly a primary mounting 12 and a toolbar mounting 14 arranged in an opposed relationship to each other. The unit 10 also includes an upper arm 16 and a lower arm 18 extending between upper and lower ends of the primary and toolbar mountings 12, 14. The arms 16, 18

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and mountings 12, 14 are pivotally attached to each other so that they can pivot relative to each other.

The primary and toolbar mountings 12, 14 and the upper and lower arms 16, 18 together form a parallelogram frame or parallelogram, indicated generally by numeral 20, the shape of which can be changed by pivoting of the mountings and the sides relative to each other while maintaining the overall parallelogram shape. A pivotal movement in one direction causes the parallelogram 20 to move to a more flattened configuration with a lower profile. By contrast a pivotal movement in the other direction causes the parallelogram 20 to adopt a more upright configuration with a higher profile.

The planter unit 10 also includes a resilient parallelogram member or a parallelogram support and shape adjuster in the form of a jump cylinder for adjusting the shape of the parallelogram. The jump cylinder is in the form of a hydraulic cylinder 22 that extends between said primary and toolbar mountings 12, 14. The jump cylinder 22 acts to support the parallelogram 20 in a certain shape.

The hydraulic cylinder 22 can respond to the application of an external force by extending or retracting to some extent but its movement is limited by the constraints of the parallelogram 20. The parallelogram 20 can move to a more upright position or it can move the other way to a more flattened position. The hydraulic cylinder 22 and indeed the parallelogram 20 will return to its original position once the outside force is removed.

In the illustrated embodiment the hydraulic cylinder 22 is positioned outside of the area defined by the mountings 12, 14 and the arms 16, 18 of the parallelogram 20. It is positioned above the upper arm 16, being mounted to upward extensions 12A and 14A of the mountings 12 and 14, each projecting up above and beyond the upper arm 16.

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The planter unit 10 also includes a gauge wheel 24 that is operatively mounted on said primary mounting 12 for engaging the surface of the soil to be seeded by the planter unit 10. The function of the gauge wheel 24 is to define a datum or reference level on the surface of the soil relative to which the seeding depth is set as will be described in more detail below.

It is important that the gauge wheel 24 travels correctly along the surface of the soil without buildozing on the one hand, or skipping over the surface of the soil, on the other hand for the efficacious seeding of the soil. The gauge wheel 24 is urged downwardly against the surface of the soil by the parallelogram 20. The downward force with which the gauge wheel 24 is urged against the soil surface is effectively determined by the pressure that is applied to the hydraulic cylinder 22. The higher the pressure in the cylinder 22 the more firmly is the gauge wheel 24 pressed down onto the soil surface. In an example embodiment a pressure of 1800 psi (12410kPa) can be applied to the hydraulic cylinder 22.

The planter unit 10 also includes a seeding arrangement shown generally by numeral 30, for dispensing seed into the soil. The seeding arrangement 30 has an operatively upper end 32 that is pivotally mounted to the primary mounting 12 and depends down there from to an operatively lower end 34, and also a seed dispenser 36 that is located at the lower end 34. The see dispenser has a formation on its leading end that is designed to engage the soil. The leading end formation can be interchanged with other leading end formations of differing shape. The leading end formation is chosen to suit the prevailing soil and moisture conditions in any application.

The planter unit 10 also includes a biasing arrangement for permitting the seeding arrangement 30 to pivot rearward relative to the primary mounting 12 to which it is pivotally mounted, and also the parallelogram 20, under the influence of an external force. The biasing arrangement is in the form of a further hydraulic cylinder 40 having one end 42 urging against the seeding arrangement 30 and the other end 44 urging against a mounting or arm of the parallelogram 20. In the

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illustrated embodiment the other end 44 of the further hydraulic cylinder 40 urges against and is coupled to the toolbar mounting 14 of the parallelogram 20.

Each of the main components outlined above will now be described in more detail.

The primary mounting 12 comprises two parallel extending spaced primary mounting plates 55. The plates 55 are held in their fixed spaced relation by two or more transverse members 56, e.g. pins or bars. Each plate 55 has an upright section 57 that is pivotally mounted to the upper arm 16 at 55A and that is mounted to the lower arm 18 at a point 55B spaced beneath the mounting to the upper arm 16. Each plate 55 also includes a trailing section 58 extending transversely away from the upright section 57 in a rearward direction. The trailing section 58 is pivotally mounted to the seeding arrangement 30 at 58A, e.g. towards the rear end of the trailing section 58.

The planter unit 10 includes two spaced forks 46 extending downward and forward from said primary mounting 12. The forks 46 are rigidly attached to the primary mounting 12 and do not move relative thereto. The forks 46 have an operatively upper end 48 that is rigid with or fast with the primary mounting 12 and an operatively lower end 50 to which the gauge wheel 24 is mounted.

The toolbar mounting 14, like the primary mounting 12, comprises two parallel extending spaced toolbar mounting plates 59 pivotally mounted to arms 16 and 18 at 16A and 18A respectively. The toolbar mounting plates 59 are held in their fixed spaced relation by two or more transverse sections 61 extending between the plates 59.

Overall each tool bar mounting plate 59 comprises an upright section and a forward extending section extending from the upright section. It also has a bracket 63 extending from a leading edge of each forward extending section down to the lower end of the upright section with a right angle or L shaped configuration. As shown in the drawings the toolbar mounting 14 has a rectangular shape when

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viewed in end view with the upright and forward extending sections of the mounting plates 59 together with the brackets 63 defining an opening within the rectangular shape. A transverse toolbar 9 shown in phantom of the frame to which the planter unit 10 is mounted is passed through the aperture and fixed to the toolbar mounting 14 by tightening the brackets 63.

The gauge wheel 24 includes a cylindrical wheel body 52 that travels over the soil surface. The outer surface of the cylindrical wheel body can be made of a rubber like material. This provides some cushioning and helps to provide a smooth travel over the surface of the soil.

The gauge wheel 24 also includes a steel disc 54, e.g. a Coulter disc, which projects radially outward away from the soil, for opening up the soil. The disc 54 typically has a radius that is 400-500m, e.g. about 450 mm and is considerably greater than that of the cylindrical wheel body 52 to penetrate the soil to a depth of 63-75mm. This helps to cut open stubble within the soil ahead of the following seeding arrangement 30 that inserts the seed into the soil.

The seeding arrangement 30 includes a shank support 70, and a shank 72 displaceably mounted on the shank support 70 towards its upper end 32. The shank support 70 is pivotally mounted to the primary mounting 12 as described above and as shown in the drawings. The shank 72 has an operatively upper end 74 that projects above the shank support 70 and an operatively lower end 76 on which the seed dispenser 36 is operatively mounted.

The seeding arrangement includes a seed depth adjuster that is shown generally by numeral 78, for adjusting the depth at which seed is dispensed into the soil during operation. The seed depth adjuster 78 comprises a checking arrangement for checking the shank 72 in any one of a plurality of positions along the shank support 70 whereby to adjust the distance from the primary mounting 12 to the seed dispenser 36 and thereby the depth at which seed is dispensed into the soil. In the illustrated embodiment the seed dispenser 36 can be set at any desired

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depth below the soil surface up to a maximum depth of 30 cm, e.g. 4 to 30 cm. A seed depth of 30 cm can be used for deep moisture sinking plantings.

In the illustrated embodiment the shank support 70 has a plurality of pin receiving apertures arranged at different heights and the shank 72 has a corresponding pin that can be aligned with a desired pin aperture and then inserted through the aligned aperture to set the seeding depth of the seed dispenser 36. As these types of mechanical arrangements for depth adjustment of a seed dispenser 36 would be known to persons skilled in the art and do not form part of the invention defined in this application it will not be described in further detail in this application.

The seed dispenser 36 is operatively coupled to a seed feeder in a manner that is known in the art. The seed dispenser 36 can be detachably mounted to the operatively lower end 76 of the shank 72. This enables an operator to interchange one seed dispenser 36 for another and to use a said seed dispenser 36 that is best suited to that particular seed sowing operation.

For example one seed dispenser that can be used is a tyne which is clearly shown in Figs 1 and 2. Another type of seed dispenser that can be used is a double disc opener and this type of seed dispenser is shown in Fig 5. Yet another seed dispenser that can be used is a chisel plough seed dispenser that is known in the art but has not been illustrated in this specification.

The planter unit 10 includes a press wheel 80 that is positioned rearward of the seed dispenser 36 relative to the direction of travel and a press wheel arm 82 for pivotally mounting the press wheel 80 to the primary mounting 12, e.g. the trailing section thereof. It also includes press wheel biasing arrangement 84 bearing against the arm 82 for biasing the press wheel 80 to a resting position in which it runs along the surface of the ground but also permits the press wheel 80 to be pivoted upwardly, e.g. in response to it encountering an obstruction to its forward movement.

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In the illustrated embodiment the biasing arrangement 84 comprises a coil spring under compression having one end bearing against the press wheel arm 82 and an opposite end bearing against the primary mounting 12.

Fig 5 illustrates a planter unit in accordance with another embodiment of the invention.

The planter unit has a number of similarities with the planter unit described above with reference to Figs 1 to 4. Accordingly unless otherwise indicated the same reference numerals will be used to describe the same components unless otherwise indicated.

The following description will focus on the differences between this embodiment and the embodiment described above.

The biasing arrangement for permitting the seeding arrangement 30 to pivot rearward relative to the primary mounting 12 is in the form of a further hydraulic cylinder 40 having its other end 44 urging against the primary mounting 12 of the parallelogram 20. In the earlier embodiment the other end 44 of the further hydraulic cylinder 40 is attached to the toolbar mounting 14 of the parallelogram 20. However apart from this structural difference the further hydraulic cylinder 40 performs the same function in this embodiment as it does in the earlier embodiment. This is because the seeding arrangement 30 and the further hydraulic cylinder 40 forming a part thereof is independent of the parallelogram 20 and is separate and independent of the jump cylinder 22 of the parallelogram 20. Therefore it does not matter to which of the mountings 12 or 14 of the parallelogram 20, the further hydraulic cylinder 40 is attached.

A further difference is that the Fig 5 embodiment has a seed dispenser 36 that is in the form of a double disc opener instead of the tyne that is shown in Fig 1. Both the tyne and the double disc opener are recognized seed dispensers that would be known to persons skilled in the art. Both the tyne and the double disc opener

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perform the same basic function of dispensing the seed into the soil spaced below the surface of the soil. They can be interchangeably fitted on the lower end of the shank. A tyne may be preferred over a double disc opener in some applications and a double disc opener may be preferred in other applications. The choice generally depends on which crop seed is used and what condition the soil is in.

In use the planter unit 10 (described in each of the Fig 1 and Fig 5 embodiments) is used to plant seed in a furrow along the length of a field as described below with particular reference to Figs 6 to 9.

During normal operation the disc 54 on the gauge wheel 24 cuts open the soil and the wheel body 52 runs along the surface of the soil 150 in the manner shown in Fig 8. The wheel body 52 rolling along the soil surface 150 acts as a reference for setting the depth of the tyne 36 on the seeding arrangement 30. The depth of the tyne is selected to suit the particular crop that is being sown and is selected by the operator based on their knowledge and experience. Some crops such as wheat have a desired seed depth of about 30-50 mm. Other crops such as chick peas or faber beans have a preferred seed depth of 40-70mm. To obtain results in terms of germination of the seeds the seeds need to be consistently placed in the soil at their preferred depth. The depth at which the seed is inserted is determined by a combination of the moisture profile and the crop being sown.

To do this the seed depth adjuster 78 on the shank 72 of the seeding arrangement 30 is set at the desired depth. This is done be checking the pin on the shank on the appropriate pin aperture on the shank support. This setting then delivers the seed into the soil 150 at the desired depth provided that the gauge wheel 24 is running correctly along the surface of the soil as shown in Fig 8.

If the gauge wheel 24 starts bull dozing as shown in Fig 6, e.g. due to local softness of the soil or moisture or bogginess in the soil 150, then the gauge wheel 24, and particularly the wheel body 52 thereof will pitch into the soil and drag along the surface of the soil 150 in the manner shown in Fig 6. This will cause a

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concomitant lowering of the depth at which the seed is delivered into the soil 150. Due to the lowering of the height of the gauge wheel 24 this will be below the depth at which it is desired to seed that particular crop.

This is disadvantageous because it typically lengthens the time to germination. It also typically reduces the prospects for successful germination of a given seed and thereby the crop yield. It also increases the resistance to displacement of the planter unit 10 through the soil 150 and therefore increases the fuel consumption of the prime mover such as a tractor or the like.

With the planter unit 10 of this invention shown in the drawings an operator can respond to this situation by reducing the pressure in the hydraulic cylinder 22 which raises the height of the gauge wheel 24 to the point where the wheel body 52 of the gauge wheel 24 runs along the surface of the soil 150 adopting the attitude shown in Fig 8. An operator achieves this by means of a hydraulic controller that will be described in more detail below.

If the gauge wheel 24 starts skipping across the soil 150 as shown in Fig 7 the seed dispenser that is a tyne 36 is raised by a concomitant amount. This causes the seed to be discharged into the soil at a shallower depth than the depth that is preferred for that seed, e.g. near to or on the surface. This situation can lead to lower levels of germination and thereby reduced crop yield.

To deal with this situation an operator increases the pressure in the hydraulic cylinder 22, e.g. by means of a hydraulic controller, which lowers the height of the gauge wheel 24 to the point where the wheel body 52 of the gauge wheel 24 runs over the surface of the soil 150 as shown in Fig 8. An operator achieves this by means of a hydraulic controller that will be described in more detail below.

In the planters of Figs 6 to 8, the cylinder 40 is attached at its end 44 to the primary mounting 12 in the same way as the Fig 5 planter unit and different to the Fig 1 planter unit. However it will be appreciated by those skilled in the art that the

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principles shown in Figs 6 to 8 and described above apply equally to a planter unit in accordance with that in Fig 1.

Figs 10 and 11 illustrate an apparatus, indicated generally by the reference numeral 100, for sowing seed using the planter units 10 described above.

In broad terms the apparatus 100 comprises a frame 102 defining a plurality of rows 104 spaced apart from other in a lateral direction. Each row 104 extends from front to rear in the direction of travel of the frame 102.

The frame 102 includes three transverse toolbars 106, 108, 110 extending the width of the frame 102 that are spaced apart from each other in the direction of travel of the frame 102. The planters 10 are evenly spaced apart along the length of each toolbar 106, or 108, or 110. Individual planter units 10 may be spaced 5.4m apart from each other along each individual toolbar. With the three transverse toolbars this translates to a space between adjacent planter units 10, on the frame as a whole, and a space between adjacent lines of seed in the ground, of about 1.4m to 1.6m.

Each row 104 includes one planter unit 10 contributed by each of the three transversely extending toolbars 106, 108, 110, and thus there are three planter units 10 in each row. Each of the planter units 10 in each row 104 are laterally offset relative to each other so that they cut and seed their own individual line in the soil that ultimately forms a line of crop.

Each transverse toolbar has a central section, and wing sections laterally disposed on each side of the central section. The frame 102 as a whole can be assembled such that lateral sections corresponding to the lateral sections of the toolbars are pivotal relative to the central section. This confers an additional ability on a frame 102 covering a large surface area to accommodate for undulations in the land to be planted.

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The frame 102 is mounted on the surface of the ground by its own frame wheels 114. These frame wheels 114 include one or more front wheels in the form of castors forward of the toolbars 106, 108, 110. They also include one or more rear wheels rearward of the toolbars 106, 108, 110.

The frame 102 also includes a draw pole 120 for operatively coupling the frame 102 to a tow hitch 122 of a tractor 124 as is shown in Fig 11.

The apparatus also includes a controller 130 for remotely adjusting the pressure in the jump cylinder that is a hydraulic cylinder 22 associated with parallelogram 20 on each planter unit 10. This controller 130 is shown schematically in Fig 12.

The controller 130 comprises a hydraulic circuit comprising hydraulic hoses 132 that are operatively coupled to the hydraulic cylinder 22 of each planter unit 10. The hydraulic hoses 132 are operatively coupled to manifold hydraulic pipes running along each of the transverse tool bars. These main lines are in turn connected to main hydraulic pipes that lead to a remote controller point 134 that is on a towing vehicle that is a tractor 124 for towing the frame 102. The apparatus also includes an accumulator 136 that is operatively coupled to the hydraulic circuit coupled in line with the main pipes.

The hydraulic circuit has a lever at the remote controller point 134 by means of which the pressure to each hydraulic cylinder 22 can be adjusted to increase or decrease the pressure in each cylinder 22 as required. The operator, e.g. on the tractor adjusts this pressure by means of the lever, movement in one direction increasing the hydraulic pressure to the hydraulic cylinder 22 and movement of the lever in the other direction decreasing the pressure. The hydraulic cylinder is a single acting hydraulic cylinder although a double acting cylinder can also be used.

In the illustrated embodiment the apparatus has a second hydraulic circuit that is similarly constructed and arranged for enabling an operator to adjust the pressure

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in the other cylinder 40. This further circuit enables the operator to similarly adjust the pressure in the hydraulic cylinder 40 associated with the seeding arrangement 30 to increase or decrease the force with which the tyne is biased towards its downwardly extending orientation.

One advantage of a planter unit described above with reference to the drawings is that the seeding arrangement, e.g. a tyne, is capable of pivoting in a rearward direction when it encounters resistance as it travels through the soil. Thus, if it strikes an obstacle such as strong root under the soil, the shank and tyne will pivot in a rearward direction up to the point where the tyne is above the obstacle and can pass over the top of it.

By contrast with prior art arrangements of which the applicant is aware the tyne and shank could not pivot rearwardly because it was rigidly coupled to the parallelogram and could only adjust, e.g. in an upward direction, to an obstacle in the soil. Its movement would be limited to that permitted by the parallelogram. In many situations this would not enable the tine to be removed from behind the obstruction and this could lead to damage of the tyne or shank or even failure of the tyne or shank.

This advantage is achieved by making the movement of the tyne independent of the movement of the parallelogram. This is achieved practically by pivotally mounting the tyne and the shank to the parallelogram and having a further hydraulic cylinder that permits movement of the tyne out its downward extending position in response to an obstacle in the soil.

Another advantage of the planter unit described above with reference to the drawings is that the seed dispenser is detachably mounted to the operatively lower end of the shank. This enables one type of seed dispenser to be replaced with another type of seed dispenser depending on what type is best suited to the sowing application at that particular time. For example the seed dispensers that

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may be detachably mounted to the shank and thereby be interchanged with each other include a tyne, a double disc opener, and a chisel plough.

Yet another advantage of the planter unit described above is that the height of the gauge wheel can be adjusted by adjusting the length of the hydraulic jump cylinder associated with the parallelogram. Extension of the hydraulic cylinder pivots the tool bar mounting forward and this in turn lowers the gauge wheel. Correspondingly the hydraulic cylinder can be retracted to raise the position of the gauge wheel. The extension or retraction of the cylinder is adjusted by adjusting the hydraulic pressure within the cylinder.

Yet another advantage of the apparatus described above with reference to the drawings is that the hydraulic cylinder associated with the parallelogram can have its length adjusted remotely from the planter unit. In particular the adjustment can be made from a central operator position that is a tractor seat. That is the adjustment can be made by a controller that is actuated by an operator seated in a tractor seat.

This enables an operator to make an adjustment to the pressure applied to the hydraulic cylinder of the parallelogram immediately they notice that the travel of the gauge wheel is less than optimum. If the gauge wheel is skipping along the ground they can increase the pressure in the cylinder and this will cause the gauge wheel to press down more firmly and cause the disc to enter the soil and the wheel body to travel along the surface pressing down against the surface.

On the other hand if the gauge wheel is bulldozing into the soil, e.g. due to soft soil, or increased moisture within the soil, or boggy soil, the operator can reduce the hydraulic pressure applied to the hydraulic cylinder and this causes the gauge wheel to lift relative to the surface of the soil to the extent that the wheel body runs evenly along the surface of the soil.

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Further this adjustment can be made by the operator while they are positioned on the tractor and without getting off the tractor. Consequently it is quick and relatively easy for an operator to make this adjustment. Consequently they can as, a practical measure, make this change as soon as they notice the gauge wheel is not travelling along the surface in an optimum fashion. As the terrain that is typically traversed in broad acre crop planting is often changes from one region of a paddock to the next, the height can be varied for each run along the length of a paddock.

Another advantage of the apparatus described above is that the hydraulic cylinders of all the planter units 10 can be adjusted simultaneously by a single hydraulic circuit. That is they are raised or lowered together by a single operator adjustment of the control levers at the ends of the hydraulic hoses that are mounted on the tractor. Significantly it is not necessary to adjust the hydraulic cylinder 22 of each planter unit 10 separately and this results in significant time savings.

It will of course be realized that the above has been given only by way of illustrative example of the invention and that all such modifications and variations thereto, as would be apparent to persons skilled in the art, are deemed to fall within the broad scope and ambit of the invention as is herein set forth.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A planter unit for seeding a body of soil having a soil surface including:

a parallelogram frame having two pairs of opposed frame members for mounting to a toolbar;

a resilient member attached to the parallelogram frame for holding the frame members of the parallelogram frame in a parallelogram shape while permitting the shape of the parallelogram frame to alter in response to an external force;

a gauge wheel operatively associated with the parallelogram frame for engaging the soil surface and travelling over the soil surface in use;

a seeding arrangement pivotably mounted to the parallelogram frame at a pivot location which includes a seed dispenser that in an operative position is spaced below the pivot location; and

a biasing arrangement for biasing the seeding arrangement to an operative position whereby movement of the seeding arrangement is independent of movement of the parallelogram frame and thus the seeding arrangement is movable relative to the parallelogram frame in response to an external force on the seeding arrangement that overcomes the bias of the biasing arrangement.

2. A planter unit as claimed in claim 1, further including control means for controlling operation of the resilient member and hence movement of the gauge wheel.

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3. A planter unit as claimed in claim 2, further including control means for controlling operation of the biasing arrangement and thus vary the bias applied to the seeding arrangement.

4. A planter unit as claimed in claim 2 or claim 3, wherein the control means is remote controlled.

5. A planter unit as claimed in any one of claims 1 to 4, wherein the parallelogram frame includes a toolbar mounting member and a primary mounting member in opposed relationship.

6. A planter unit as claimed in claim 5, wherein the parallelogram frame includes a pair of opposed arms which interconnect the toolbar mounting member and the primary mounting member and wherein each arm is pivotably mounted to the toolbar mounting member and the primary mounting member.

7. A planter unit as claimed in claim 5 or claim 6, wherein the biasing arrangement is a resilient biasing member pivotably connected to the primary mounting member and interconnecting the seeding arrangement and the primary mounting member.

8. A planter unit as claimed in any one of claims 3 to 5, wherein the gauge wheel is rigidly connected to the primary mounting member.

9. A planter unit as claimed in any one of claims 5 to 8, wherein the resilient member interconnects and is pivotably attached to the toolbar mounting member and the primary mounting member.

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10. A planter unit as claimed in any one of claims 1 to 9, wherein the resilient member is a hydraulic cylinder having a pressure adjuster for adjusting the pressure within the hydraulic cylinder.

11. A planter unit as claimed in any one of claims 1 to 10, wherein the seeding arrangement is a shank having the seed dispenser mounted on a lower end of the shank.

12. A planter unit as claimed in claim 11, wherein the shank is coupled to a seed depth adjuster for varying a vertical height of the shank.

13. A planter unit as claimed in any one of claims 4 to 12, wherein the toolbar mounting member includes a mounting formation for mounting the planter unit to a toolbar and a bracket for extending around the toolbar in use.

14. A planter unit as claimed in any one of claims 2 to 9 or claims 11 to 13, wherein the resilient member is a hydraulic cylinder having a pressure adjuster for adjusting the pressure of the hydraulic cylinder and said control means is a controller operatively connected to the hydraulic cylinder which can be operated from a remote location.

15. A planter unit as claimed in any one of claims 3 to 14, wherein the control means includes a hydraulic circuit that interconnects to the hydraulic cylinder and a prime mover attached to the planter unit.

16. A planter unit for seeding a body of soil having a soil surface including:

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a parallelogram frame having two pairs of opposed frame members for mounting to a toolbar;

a resilient member attached to the parallelogram frame for holding the frame members of the parallelogram frame in a parallelogram shape while permitting the shape of the parallelogram to alter in response to an external force;

a gauge wheel operatively associated with the parallelogram frame for engaging the soil surface and travelling over the soil surface in use;

a seeding arrangement attached to the parallelogram frame which includes a seed dispenser that in an operative portion is received in the soil in use to deliver seed into the soil; and

control means for controlling movement of the resilient member and hence movement of the gauge wheel from a remote location.

17. A planter unit as claimed in claim 16, wherein the resilient member is a hydraulic cylinder extending between opposed frame members of the parallelogram frame and said control means is a controller spaced from the hydraulic cylinder for enabling an operator to control the hydraulic pressure in the hydraulic cylinder and thereby the extension or retraction of the hydraulic cylinder from a remote location.

18. A planter unit for seeding a body of soil having a soil surface including for:

a parallelogram frame having two pairs of opposed frame members for mounting to a toolbar;

a resilient member attached to the parallelogram frame for holding the frame members of the parallelogram frame in a parallelogram shape while

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permitting the shape of the parallelogram to alter in response to an external force;

a gauge wheel operatively associated with the parallelogram frame for engaging the soil surface and travelling over the soil surface in use;

a seeding arrangement attached to the parallelogram frame which includes a seed dispenser that in an operative portion is received in the soil in use to deliver seed into the soil and

control means for

(i) controlling operation of the resilient member and hence movement of the gauge wheel; and

(ii) controlling operation of the biasing arrangement and thus vary the degree of bias applied to the seeding arrangement.

19. A method of operation of a planter unit which includes the step of controlling from a remote location operation of a resilient member attached to a parallelogram frame of the planter unit so as to control movement of a gauge wheel attached to the parallelogram frame for varying the depth of the gauge wheel in soil being traversed by the planter unit.

20. A method as claimed in claim 19 which includes a further step of controlling from a remote location operation of a biasing means associated with a seeding arrangement of the planter unit whereby bias applied to the seeding arrangement is varied.

21. Apparatus for planting seed in a number of rows simultaneously which includes:

a frame; and

a plurality of planter units as claimed in any one of claims 1-18 attached to the frame.

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22. A planter unit for seeding a body of soil having a soil surface substantially in accordance with any one of the embodiments described in the detailed description of the invention with reference to the drawings.

23. A method of operation of a planter unit which includes the step of controlling from a remote location operation of a resilient member attached to a parallelogram frame of the planter unit substantially as herein described in the detailed description of the invention with reference to the drawings.

24. Apparatus for planting seed in a number of rows simultaneously which includes a frame, and a plurality of planter units substantially as herein described in the detailed description of the invention with reference to the drawings.

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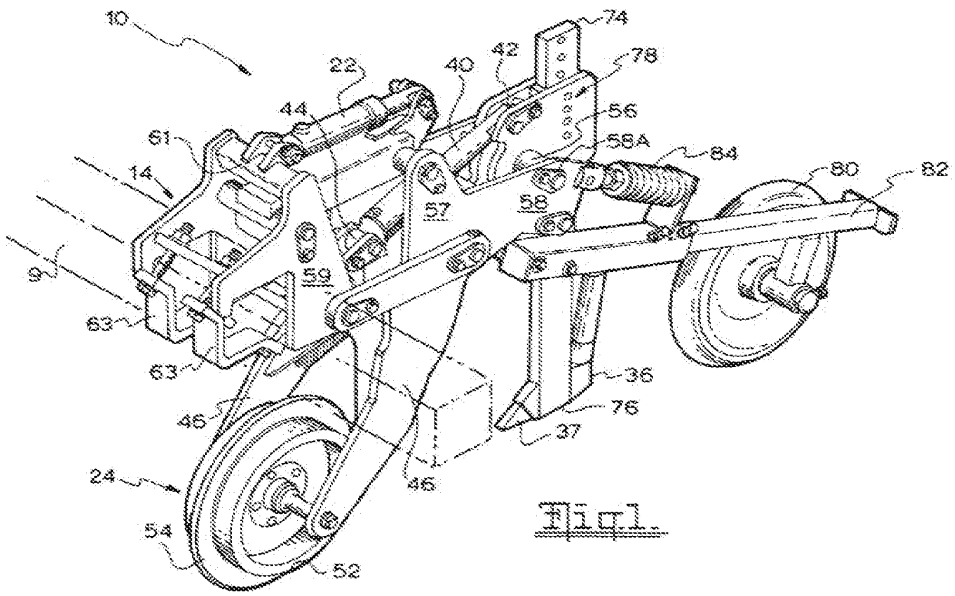

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Fig 1

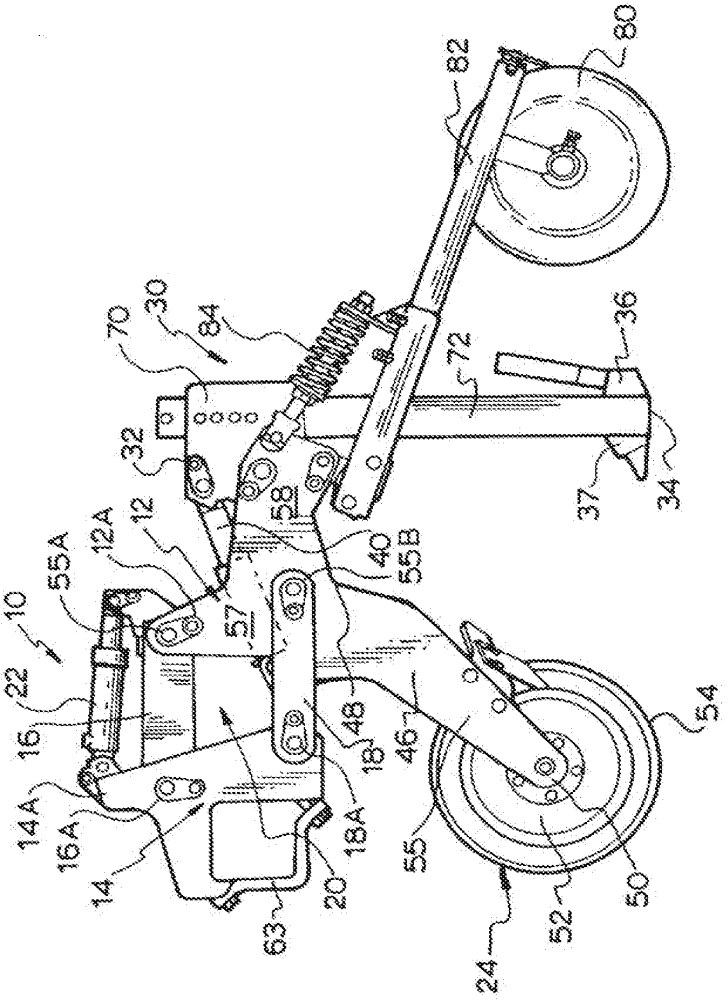


Fig-2.

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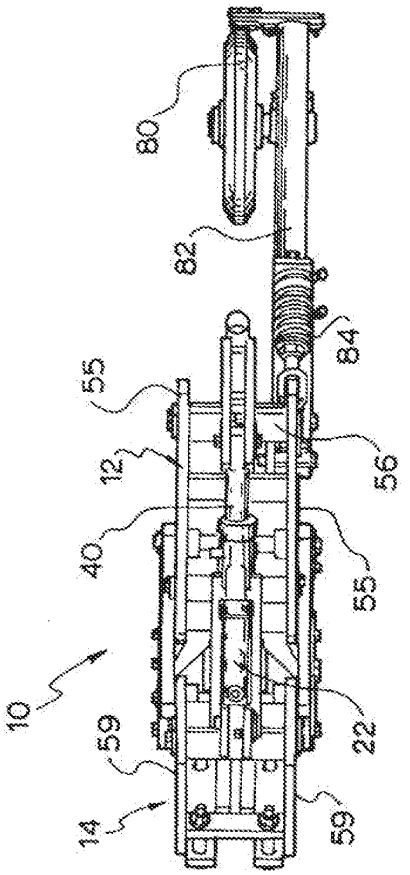


Fig.4.

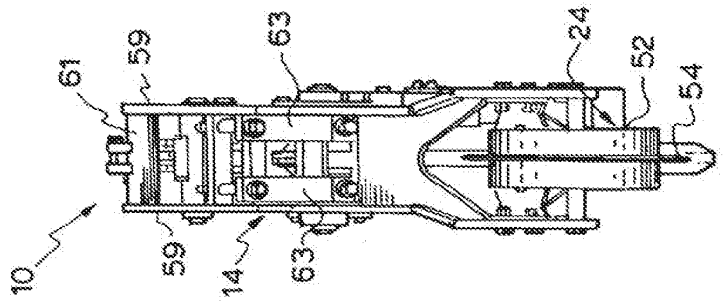


Fig.3.

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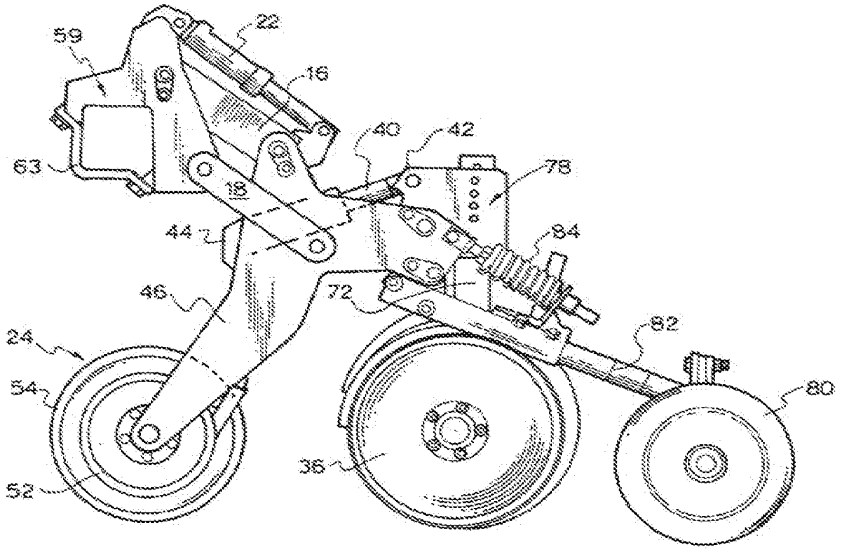


Fig.5.

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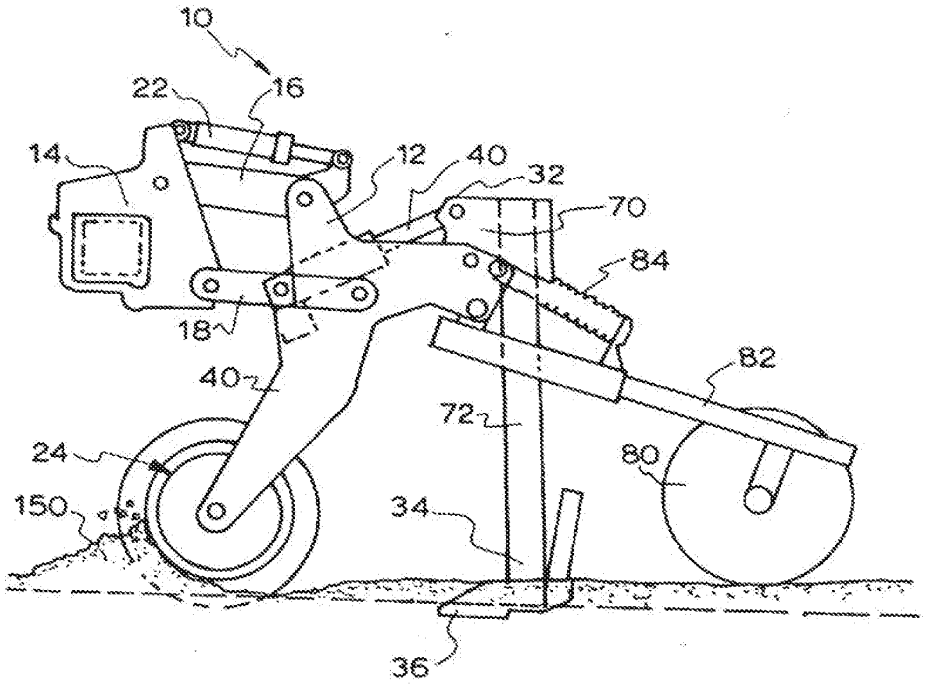


Fig.6.

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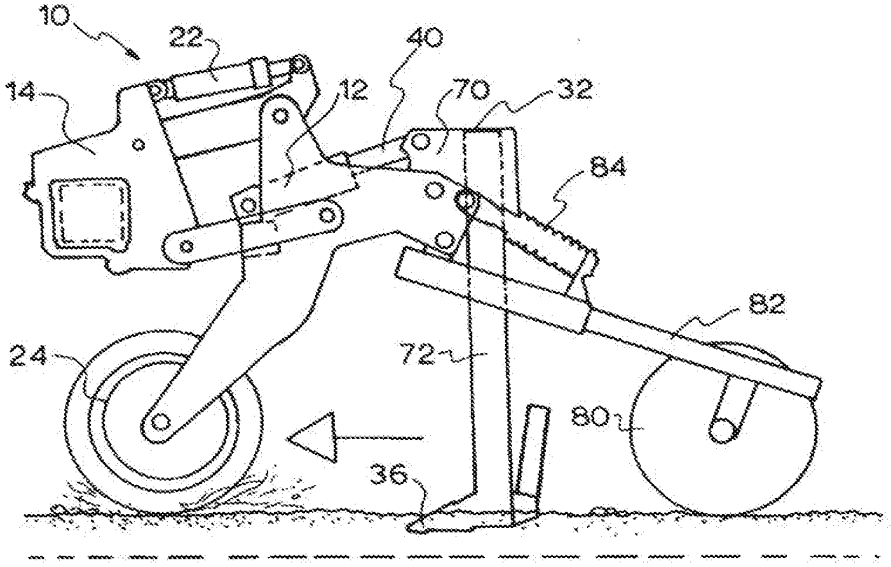


Fig. 7.

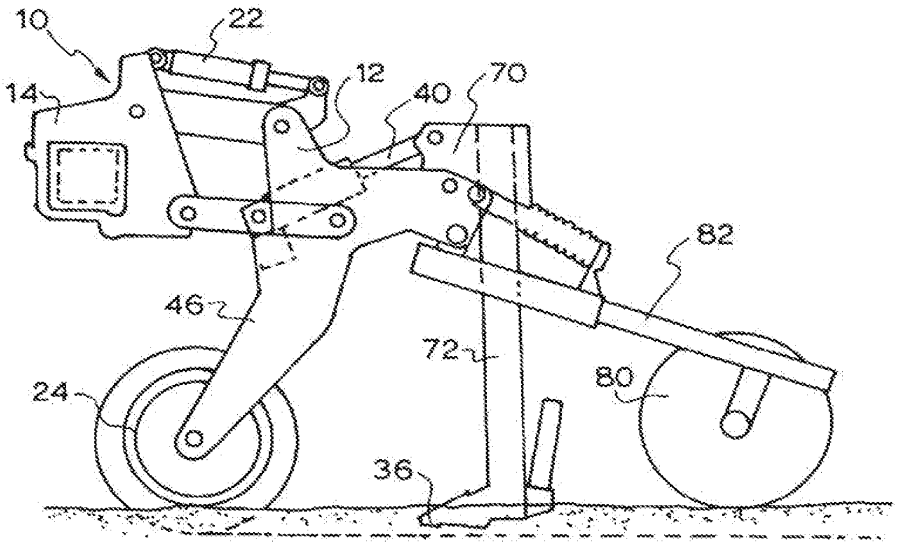


Fig. 8.

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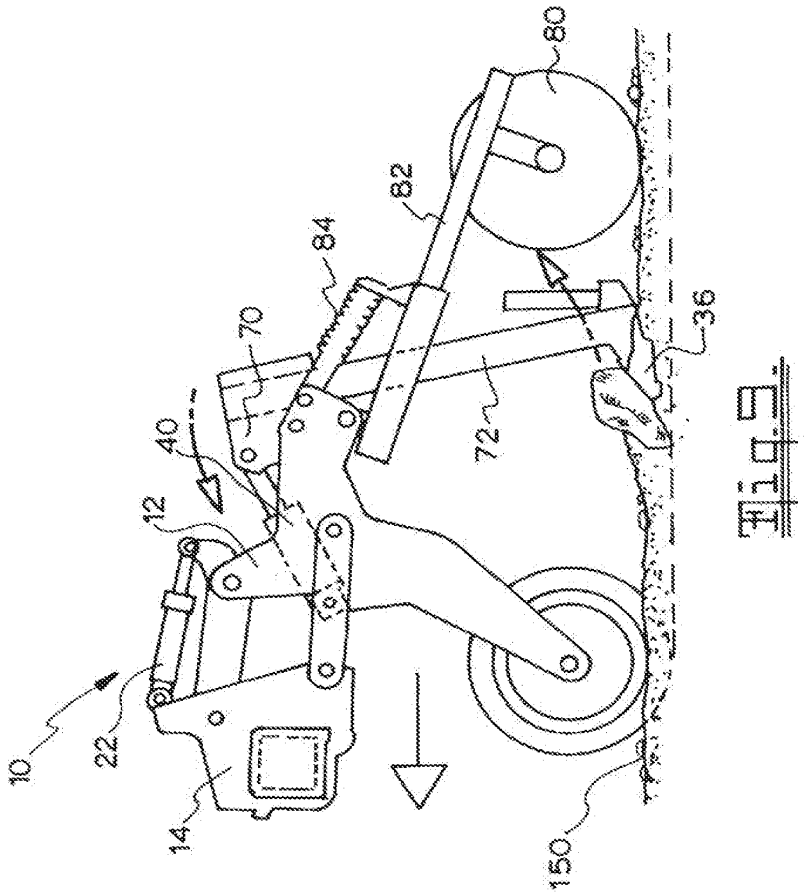


Fig. 7

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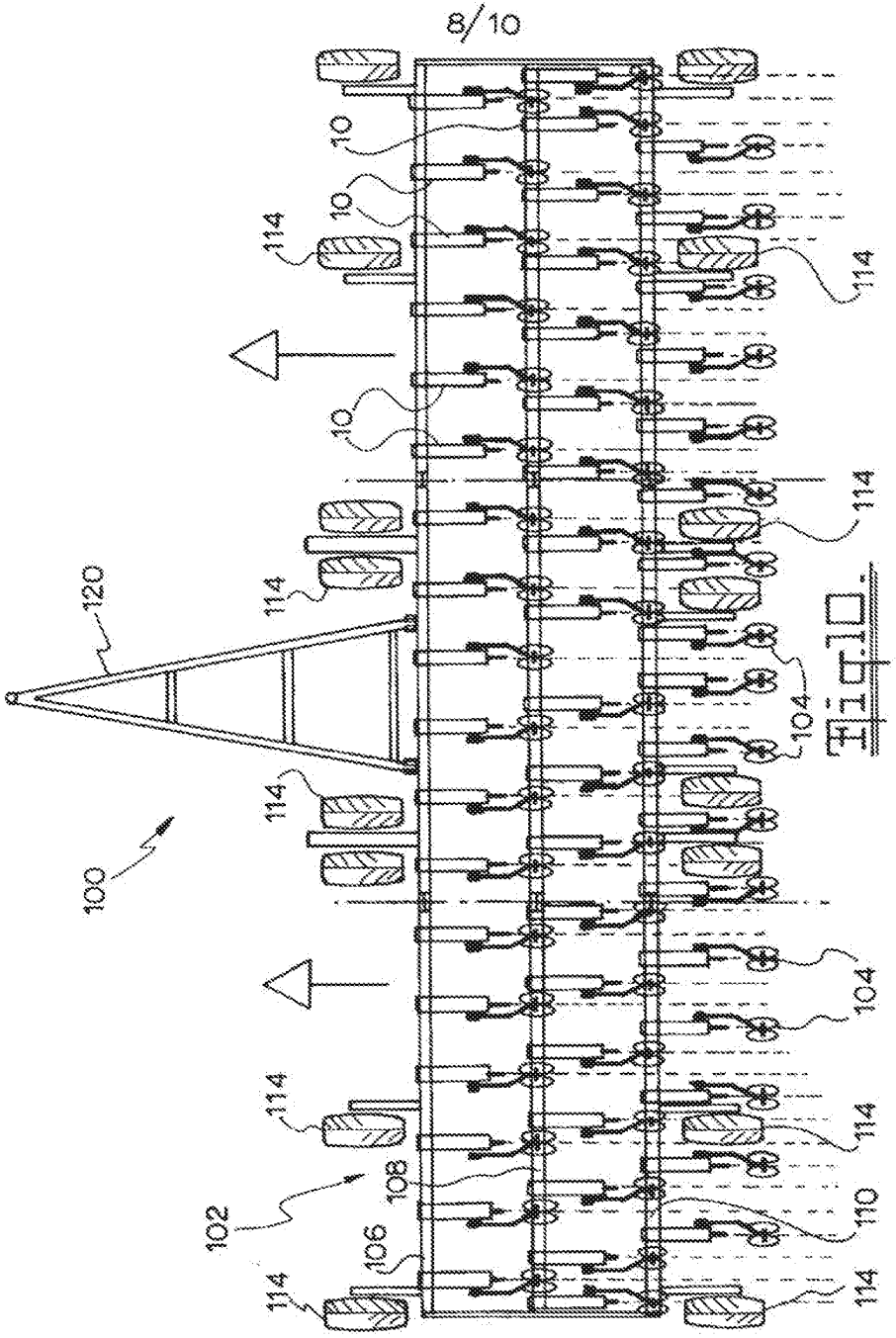


Fig.10.

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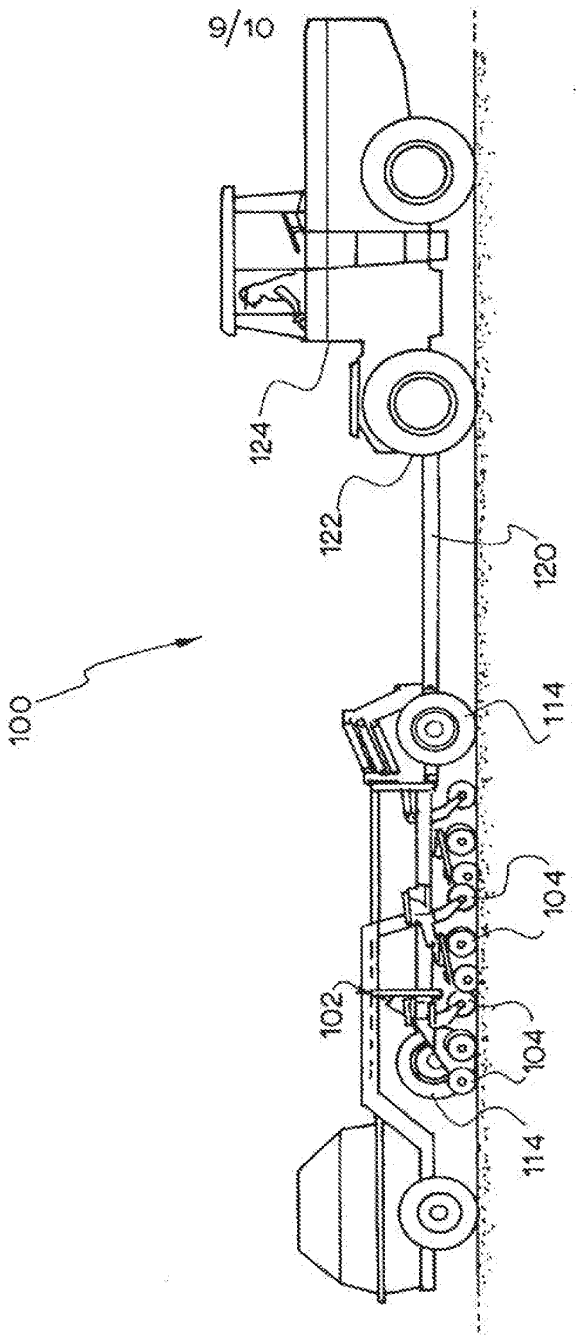


Fig.11.

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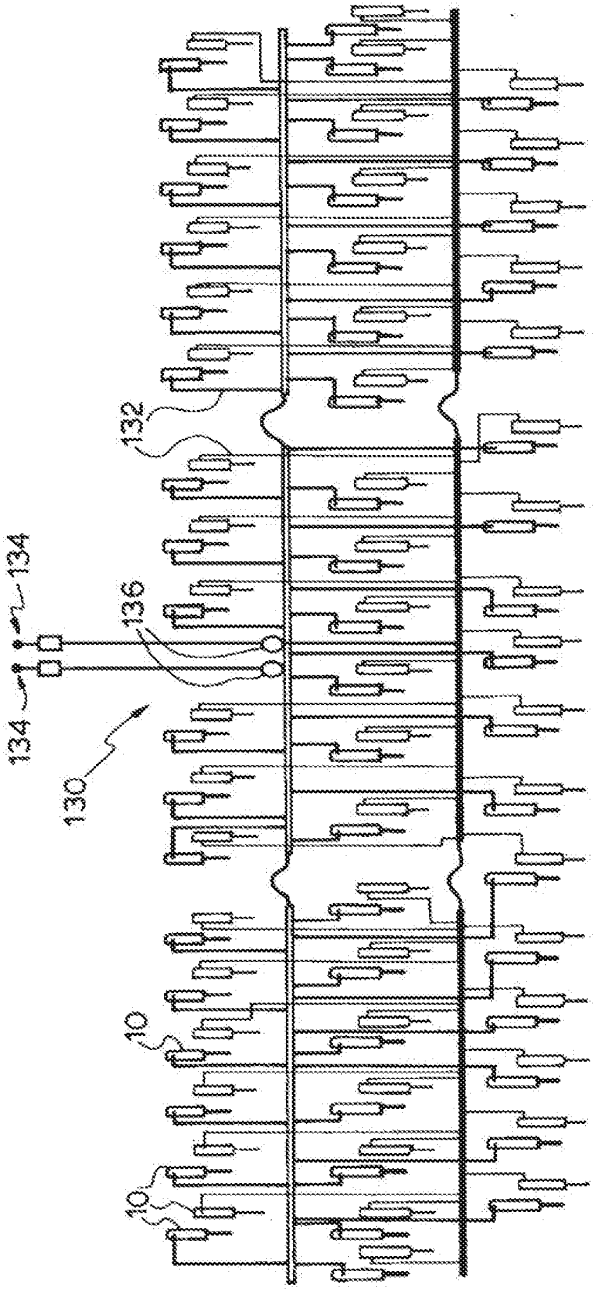


Figure 12

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DECLARATION AND ASSIGNMENT

THIS ASSIGNMENT is dated **December 16, 2016.**

I, **Benjamin Anson FANSHIER and Rex SCHERTZ** (hereinafter individually and collectively "the **Inventor**") believe that I am the original inventor or joint inventor of an Invention entitled:

IMPLEMENT CONTOURING TOOLBAR

(hereinafter "the **Invention**") which is subject to US Provisional Patent Application Number **62/435,118**, filed December 16, **2016**; Attorney Ref: **US16/40/US**; (hereinafter "the **Application**"). The above-identified application was made or authorized to be made by me. I hereby acknowledge that any wilful false statement made in this Declaration is punishable under 18 U.S.C. §1001 by fine or imprisonment of not more than five (5) years, or both.

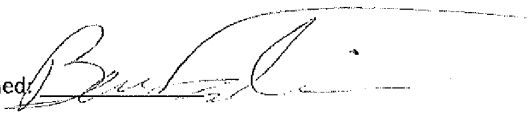
WHEREAS,

AGCO CORPORATION, a company incorporated according to the laws of the state of Delaware, having a registered address of 4205 River Green Parkway, Duluth, Georgia 30096, USA (hereinafter "the **Assignee**"), desires to acquire the entire right, title and interest throughout the world in and to said Invention and Application, including any and all divisions and continuations thereof, all rights of priority under the terms of the Paris Convention for the Protection of Industrial Property, and any and all Letters Patent which may be granted thereon, including any and all renewals, reissues and prolongations thereof.

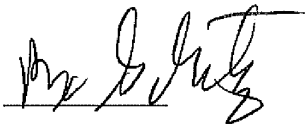
NOW, THEREFORE, in consideration of the sum of one dollar ($1.00) and other good and valuable consideration, the receipt, adequacy and sufficiency of which are hereby acknowledged, the Inventor hereby confirms the assignment to said Assignee, its assigns and legal representatives, the entire right, title and interest throughout the world, in and to said Invention and Application, including any and all divisions and continuations thereof, all rights of priority under the terms of the Paris Convention for the Protection of Industrial Property, and any and all Letters Patent which may be granted thereon, including any and all renewals, reissues and prolongations thereof, with all the rights, powers, privileges, and advantages in any way arising from or pertaining thereto, for and during the term or terms of any and all such Letters Patent, including the right to recover and take all such proceedings as may be necessary for recovery of damages or otherwise in respect of all infringements of any patent or patents granted pursuant to the Application.

TO HAVE HOLD USE AND ENJOY the same unto the Assignee their successors and assigns absolutely, to the intent that the grant of Letters Patent in any country shall be in the name of and shall vest in the Assignee.

IN WITNESS WHEREOF, executed by the undersigned

Signed: 

Name: **BENJAMIN ANSON FANSHIER**

Signed: 

Name: **REX SCHERTZ**

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	IMPLEMENT CONTORING TOOLBAR
First Named Inventor/Applicant Name:	Benjamin Anson FANSHIER
Filer:	Linda Blankenship
Attorney Docket Number:	US16/40/WO/US-2

Filed as Large Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
NATIONAL STAGE FEE	1631	1	300	300
NATL STAGE SEARCH FEE - REPORT PROVIDED	1642	1	520	520
NATIONAL STAGE EXAM - ALL OTHER CASES	1633	1	760	760
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1580**

Electronic Acknowledgement Receipt	
EFS ID:	36321597
Application Number:	16470472
International Application Number:	PCT/IB2017/001298
Confirmation Number:	1653
Title of Invention:	IMPLEMENT CONTORING TOOLBAR
First Named Inventor/Applicant Name:	Benjamin Anson FANSHIER
Customer Number:	88988
Filer:	Linda Blankenship
Filer Authorized By:	
Attorney Docket Number:	US16/40/WO/US-2
Receipt Date:	17-JUN-2019
Filing Date:	
Time Stamp:	16:41:03
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$1580
RAM confirmation Number	061819INTEFSW00003605010442
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	US1640WOUS-2_ADS.pdf	1823206 60aefeafe9ee7f0cd0a27398a4594593f2cb7aa2	no	8
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Information:					
2		WO2018109545.pdf	1196063 e7db8dc4d0d578e70e84c7c5351930c3bb4c6273	yes	37

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Abstract	1	1
Specification	2	23
Claims	24	28
Drawings-only black and white line drawings	29	35
Other Reference-Patent/App/Search documents	36	37

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Document Description	**Start**	**End**
Preliminary Amendment	1	1
Claims	2	7

	Applicant Arguments/Remarks Made in an Amendment		8	8	
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			Total Files Size (in bytes):	72805043	

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/AIA/14 (11-15)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US16/40/WO/US-2
	Application Number	
Title of Invention	IMPLEMENT CONTOURING TOOLBAR	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Benjamin	Anson	Fanshier	

Residence Information (Select One) ● US Residency Non US Residency Active US Military Service

City	State/Province	Country of Residence
Hesston	KS	US

Mailing Address of Inventor:

Address 1	c/o AGCO Corporation
Address 2	420 W. Lincoln Boulevard
City	Hesston
State/Province	KS
Postal Code	67062-0969
Country	US

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Rex		Schertz	

Residence Information (Select One) ◉ US Residency Non US Residency Active US Military Service

City	State/Province	Country of Residence
Hesston	KS	US

Mailing Address of Inventor:

Address 1	c/o AGCO Corporation
Address 2	420 W. Lincoln Boulevard
City	Hesston
State/Province	KS
Postal Code	67062-0969
Country	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US16/40/WO/US-2
	Application Number	
Title of Invention	IMPLEMENT CONTOURING TOOLBAR	

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	88988		
Email Address	patents@agcocorp.com	Add Email	Remove Email

Application Information:

Title of the Invention	IMPLEMENT CONTOURING TOOLBAR		
Attorney Docket Number	US16/40/WO/US-2	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	7	**Suggested Figure for Publication (if any)**	1

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	88988		

PTO/AIA/14 (11-15)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US16/40/WO/US-2
	Application Number	
Title of Invention	IMPLEMENT CONTOURING TOOLBAR	

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	a 371 of international	PCT/IB2017/001298	2017-10-26
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
PCT/IB2017/001298	Claims benefit of provisional	62/435118	2016-12-16

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US16/40/WO/US-2
	Application Number	
Title of Invention	IMPLEMENT CONTOURING TOOLBAR	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US16/40/WO/US-2
	Application Number	
Title of Invention	IMPLEMENT CONTOURING TOOLBAR	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	AGCO Corporation		
Mailing Address Information For Applicant:			
Address 1	4205 River Green Parkway		
Address 2			
City	Duluth	**State/Province**	GA
Country	US	Postal Code	30096
Phone Number	620 327 6993	Fax Number	
Email Address	patents@agcocorp.com		

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

PTO/AIA/14 (11-15)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US16/40/WO/US-2
	Application Number	
Title of Invention	IMPLEMENT CONTOURING TOOLBAR	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Linda Blankenship/			Date (YYYY-MM-DD)	2019-06-17
First Name	Linda	Last Name	Blankenship	Registration Number	75274

Additional Signature may be generated within this form by selecting the Add button. Add

PTO/AIA/14 (11-15)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US16/40/WO/US-2
	Application Number	
Title of Invention	IMPLEMENT CONTOURING TOOLBAR	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2017/001298

A. CLASSIFICATION OF SUBJECT MATTER
INV. A01B63/114 A01B63/32
ADD.

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)
A01B A01C

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2014/066654 A1 (PREC PLANTING LLC [US]) 1 May 2014 (2014-05-01) paragraph [0020] - paragraph [0036] figure 1	1-20
X	US 2015/230391 A1 (HOUCK SHANE [US]) 20 August 2015 (2015-08-20) paragraph [0040] - paragraph [0061]	1-20
X	US 6 112 827 A (REIBER PHILLIP A [CA] ET AL) 5 September 2000 (2000-09-05) figure 3 column 13, line 49 - column 15, line 40	1-20
X	EP 2 524 587 A1 (DEERE & CO [US]) 21 November 2012 (2012-11-21) the whole document	1-20

☐ 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

"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	Date of mailing of the international search report
5 January 2018	25/01/2018

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Van Woensel, Gerry

1

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2017/001298

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2014066654 A1	01-05-2014	AR 093136 A1	20-05-2015
		AU 2013334552 A1	21-05-2015
		AU 2017248423 A1	02-11-2017
		CA 2888970 A1	01-05-2014
		EP 2911493 A1	02-09-2015
		US 2015289438 A1	15-10-2015
		US 2017359944 A1	21-12-2017
		US 2017359945 A1	21-12-2017
		WO 2014066654 A1	01-05-2014
US 2015230391 A1	20-08-2015	NONE	
US 6112827 A	05-09-2000	CA 2289240 A1	12-05-2000
		CA 2289242 A1	12-05-2000
		CA 2289259 A1	12-05-2000
		CA 2289263 A1	12-05-2000
		CA 2289288 A1	12-05-2000
		CA 2289293 A1	12-05-2000
		CA 2289312 A1	12-05-2000
		CA 2289377 A1	12-05-2000
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		US 6131669 A	17-10-2000
		US 6167972 B1	02-01-2001
		US 6189465 B1	20-02-2001
		US 6192994 B1	27-02-2001
		US 6202756 B1	20-03-2001
		US 6293352 B1	25-09-2001
		US 6305478 B1	23-10-2001
EP 2524587 A1	21-11-2012	AR 086498 A1	18-12-2013
		BR 102012012034 A2	18-06-2013
		CN 102812800 A	12-12-2012
		EP 2524587 A1	21-11-2012
		ES 2493190 T3	11-09-2014
		RU 2012118399 A	10-11-2013
		US 2012291680 A1	22-11-2012

Form PCT/ISA/210 (patent family annex) (April 2005)

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

PCT/IB2017/001298
International Application No.

26 OCTOBER 2017 (26.10.17)
International Filing Date

INTERNATIONAL BUREAU OF WIPO
PCT International Application
Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference *(if desired) (12 characters maximum)* US16/40WO

Box No. I TITLE OF INVENTION

IMPLEMENT CONTOURING TOOLBAR

Box No. II APPLICANT ☐ This person is also inventor

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

AGCO CORPORATION
4205 RIVER GREEN PARKWAY
DULUTH
GEORGIA

Telephone No.
7708136164

Facsimile No.
7708136140

Applicant's registration No. with the Office

E-mail authorization: Marking one of the check-boxes below authorizes the receiving Office, the International Searching Authority, the International Bureau and the International Preliminary Examining Authority to use the e-mail address indicated in this Box to send notifications issued in respect of this international application to that e-mail address if those offices are willing to do so.

☐ as advance copies followed by paper notifications; or ☐ exclusively in electronic form (no paper notifications will be sent).

E-mail address:

State *(that is, country)* of nationality: US

State *(that is, country)* of residence: US

This person is applicant for the purposes of: ☐ all designated States ☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

☒ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: ☐ agent ☐ common representative

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

AGCO INTELLECTUAL PROPERTY DEPARTMENT
ABBEY PARK STONELEIGH
KENILWORTH
ENGLAND CV8 2TQ

Telephone No.
+44(0) 24 7685 2171

Facsimile No.
+44(0) 24 7685 2620

Agent's registration No. with the Office

E-mail authorization: Marking one of the check-boxes below authorizes the receiving Office, the International Searching Authority, the International Bureau and the International Preliminary Examining Authority to use the e-mail address indicated in this Box to send notifications issued in respect of this international application to that e-mail address if those offices are willing to do so.

☒ as advance copies followed by paper notifications; or ☐ exclusively in electronic form (no paper notifications will be sent).

E-mail address: LYNE.MURRAY@AGCOCORP.COM

☒ **Address for correspondence:** Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

CONFIRMATION COPY

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
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Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

If none of the following sub-boxes is used, this sheet should not be included in the request.

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

FANSHIER, Benjamin Anson
c/o AGCO Corporation
420 W. Lincoln Boulevard
Hesston, KS 67062-0969 USA

This person is:
- ☐ applicant only
- ☐ applicant and inventor
- ☒ inventor only *(If this check-box is marked, do not fill in below.)*

Applicant's registration No. with the Office

State *(that is, country)* of nationality: US

State *(that is, country)* of residence: USA

This person is applicant for the purposes of: ☐ all designated States ☐ the States indicated in the Supplemental Box

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

SCHERTZ, Rex
c/o AGCO Corporation
420 W. Lincoln Boulevard
Hesston, KS 67062-0969 USA

This person is:
- ☐ applicant only
- ☐ applicant and inventor
- ☒ inventor only *(If this check-box is marked, do not fill in below.)*

Applicant's registration No. with the Office

State *(that is, country)* of nationality: US

State *(that is, country)* of residence: USA

This person is applicant for the purposes of: ☐ all designated States ☐ the States indicated in the Supplemental Box

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

This person is:
- ☐ applicant only
- ☐ applicant and inventor
- ☐ inventor only *(If this check-box is marked, do not fill in below.)*

Applicant's registration No. with the Office

State *(that is, country)* of nationality:

State *(that is, country)* of residence:

This person is applicant for the purposes of: ☐ all designated States ☐ the States indicated in the Supplemental Box

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

This person is:
- ☐ applicant only
- ☐ applicant and inventor
- ☐ inventor only *(If this check-box is marked, do not fill in below.)*

Applicant's registration No. with the Office

State *(that is, country)* of nationality:

State *(that is, country)* of residence:

This person is applicant for the purposes of: ☐ all designated States ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on another continuation sheet.

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Box No. V DESIGNATIONS

The filing of this request **constitutes under Rule 4.9(a) the designation** of all Contracting States bound by the PCT on the international filing date, for the grant of every kind of protection available and, where applicable, for the grant of both regional and national patents.

However,

☐ DE Germany **is not designated** for any kind of national protection

☐ JP Japan **is not designated** for any kind of national protection

☐ KR Republic of Korea **is not designated** for any kind of national protection

(The check-boxes above may only be used to exclude (irrevocably) the designations concerned if, at the time of filing or subsequently under Rule 26bis.1, the international application contains in Box No. VI a priority claim to an earlier national application filed in the particular State concerned, in order to avoid the ceasing of the effect, under the national law, of this earlier national application.)

Box No. VI PRIORITY CLAIM AND DOCUMENT

The priority of the following earlier application(s) is hereby claimed:

Filing date of earlier application *(day/month/year)*	Number of earlier application	Where earlier application is:		
		national application: country or Member of WTO	regional application: regional Office	international application: receiving Office
item (1) 16/12/2016 16th December 2016	62/435118	US		
item (2)				
item (3)				

☐ Further priority claims are indicated in the Supplemental Box.

Furnishing the priority document(s):

☐ The **receiving Office** is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) *(only if the earlier application(s) was filed with the receiving Office which, for the purposes of this international application, is the receiving Office)* identified above as:

☐ all items ☐ item (1) ☐ item (2) ☐ item (3) ☐ other, see Supplemental Box

☒ The **International Bureau** is requested to obtain from a digital library a certified copy of the earlier application(s) identified above, using, where applicable, the access code(s) indicated below *(if the earlier application(s) is available to it from a digital library)*:

☒ item (1) access code 4632 ☐ item (2) access code _____ ☐ item (3) access code _____ ☐ other, see Supplemental Box

Restore the right of priority: the receiving Office is requested to restore the right of priority for the earlier application(s) identified above or in the Supplemental Box as item(s) (_____). *(See also the Notes to Box No. VI: further information **must** be provided to support a request to restore the right of priority.)*

Incorporation by reference: where an element of the international application referred to in Article 11(1)(iii)(d) or (e) or a part of the description, claims or drawings referred to in Rule 20.5(a) is not otherwise contained in this international application but is completely contained in an earlier application whose priority is claimed on the date on which one or more elements referred to in Article 11(1)(iii) were first received by the receiving Office, that element or part is, subject to confirmation under Rule 20.6, incorporated by reference in this international application for the purposes of Rule 20.6.

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) *(if more than one International Searching Authority is competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used)*:

ISA/ EP

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Box No. IX **CHECK LIST for PAPER filings** – this sheet is only to be used when filing an international application on **PAPER**

This international application **contains the following**:	Number of sheets
(a) request form PCT/RO/101 (including any declarations and supplemental sheets) :	4
(b) description (excluding any sequence listing part of the description, see (f), below) :	22
(c) claims :	5
(d) abstract :	1
(e) drawings (if any) :	7
(f) sequence listing part of the description (if any) :	
Total number of sheets :	39

This international application is **accompanied by** the following item(s) *(mark the applicable check-boxes below and indicate in right column the number of each item)*:	Number of items
1. ☐ fee calculation sheet :	
2. ☐ original separate power of attorney :	
3. ☐ original general power of attorney :	
4. ☐ copy of general power of attorney; reference number: :	
5. ☐ priority document(s) identified in Box No. VI as item(s) :	
6. ☐ Translation of international application into *(language)*: :	
7. ☐ separate indications concerning deposited microorganism or other biological material :	
8. ☐ *(only where item (f) is marked in the left column)* copy in electronic form (Annex C/ST.25 text file) on physical data carrier(s) of the sequence listing, not forming part of the international application, which is **furnished only for the purposes of international search** under Rule 13*ter* *(type and number of physical data carriers)* :	
9. ☐ *(only where item (f) (in the left column) and item 8 (above) are marked)* a statement confirming that "the information recorded in electronic form submitted under Rule 13*ter* is identical to the sequence listing as contained in the international application" as filed on paper :	
10. ☐ copy of results of earlier search(es) (Rule 12*bis*.1(a)) :	
11. ☐ other *(specify)*: :	

Figure of the drawings which should accompany the abstract:	1	**Language of filing** of the international application:	EN

Box No. X **SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE**

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

.....

DAVID MARDEN
for and on behalf of the Applicant

For receiving Office use only

1. Date of actual receipt of the purported international application: 26 OCTOBER 2017 (26.10.17)	2. Drawings: ☐ received: ☐ not received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:	
4. Date of timely receipt of the required corrections under PCT Article 11(2):	
5. International Searching Authority (if two or more are competent): ISA / EP	6. ☑ Transmittal of search copy delayed until search fee is paid

For International Bureau use only

Date of receipt of the record copy by the International Bureau:

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Application number: 62435118

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THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

October 30, 2017

THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM THE RECORDS OF THE UNITED STATES PATENT AND TRADEMARK OFFICE OF THOSE PAPERS OF THE BELOW IDENTIFIED PATENT APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A FILING DATE UNDER 35 USC 111.

APPLICATION NUMBER: *62/435,118*
FILING DATE: *December 16, 2016*

THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS CONVENTION, IS *US62/435,118*

Certified by

Michelle K. Lee

Under Secretary of Commerce
for Intellectual Property
and Director of the United States
Patent and Trademark Office

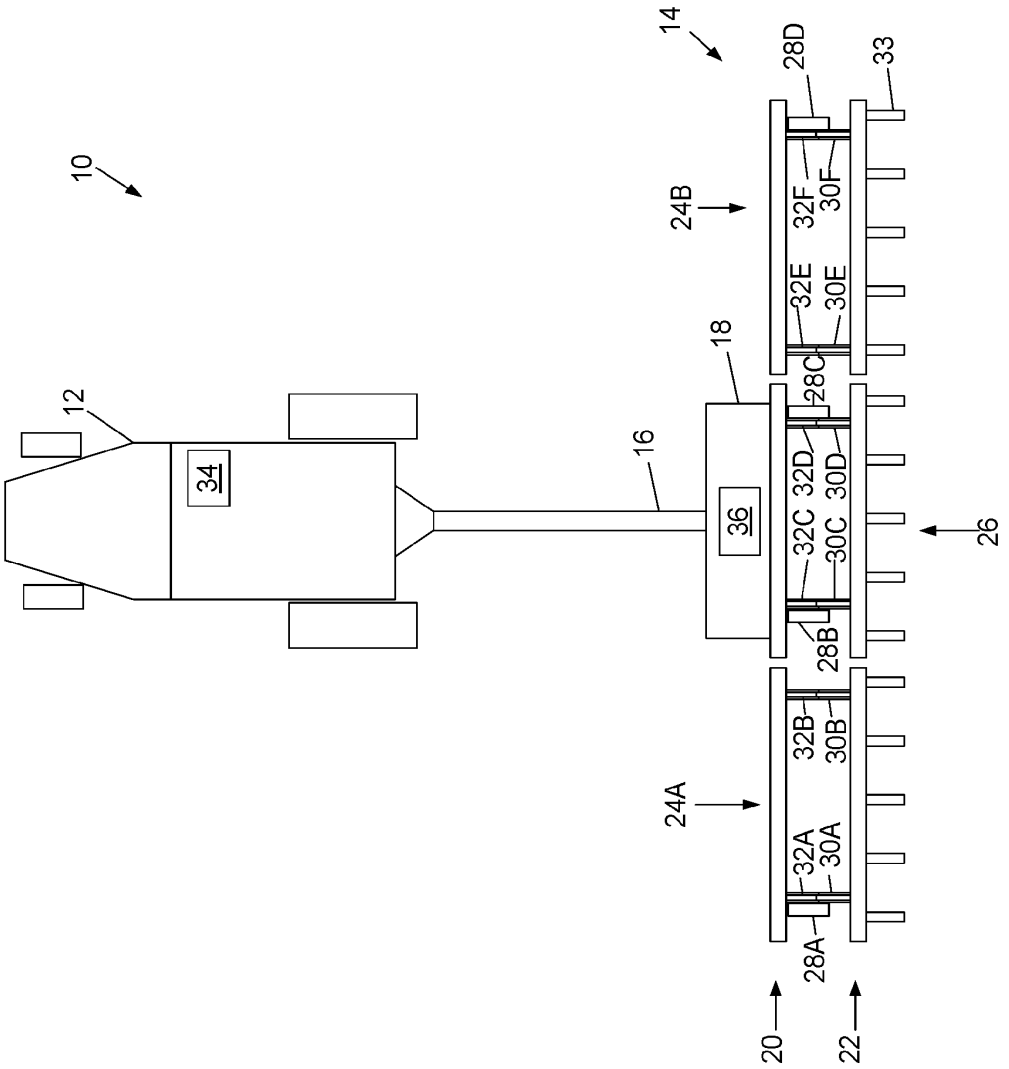

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24B
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FIG. 1

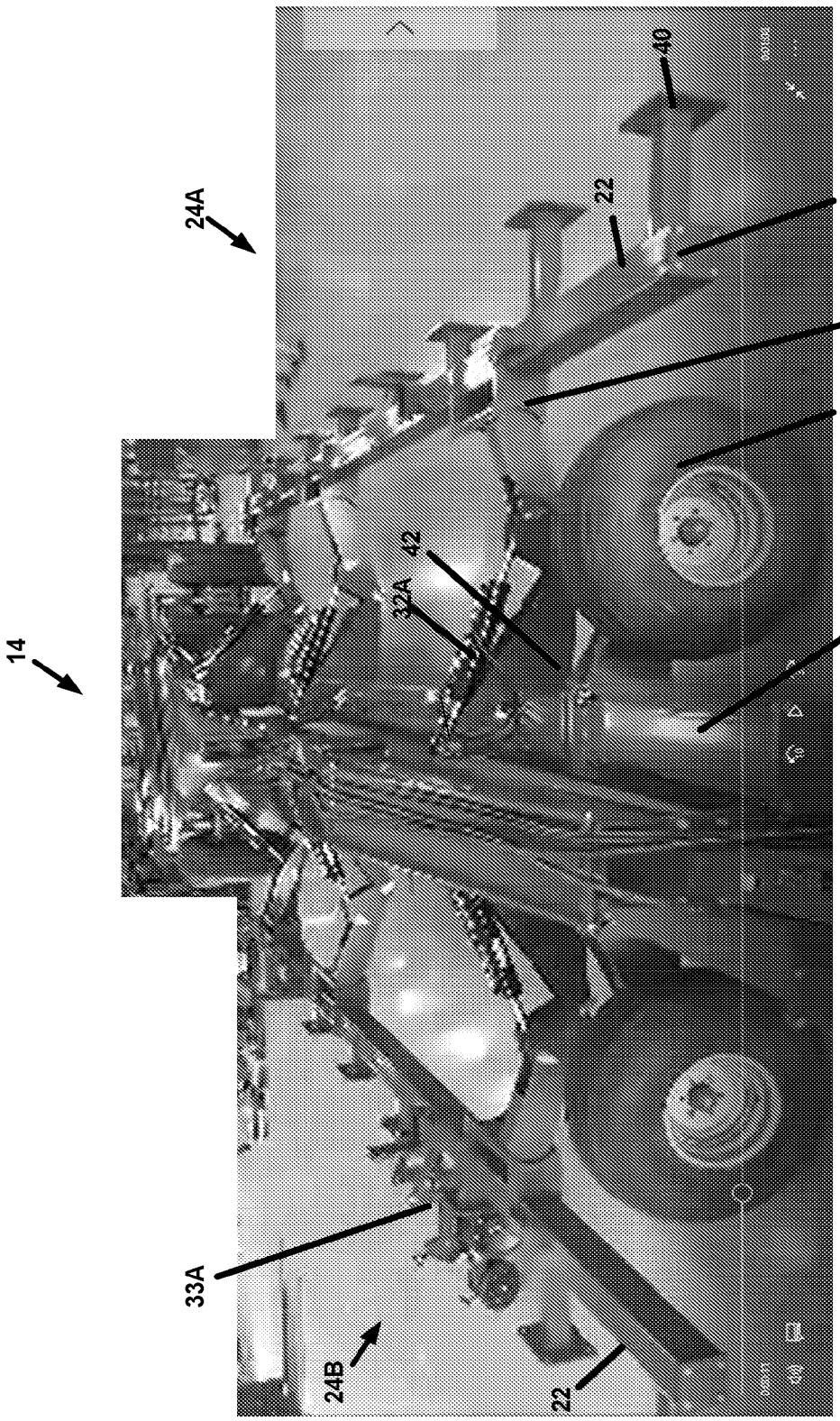


FIG. 2

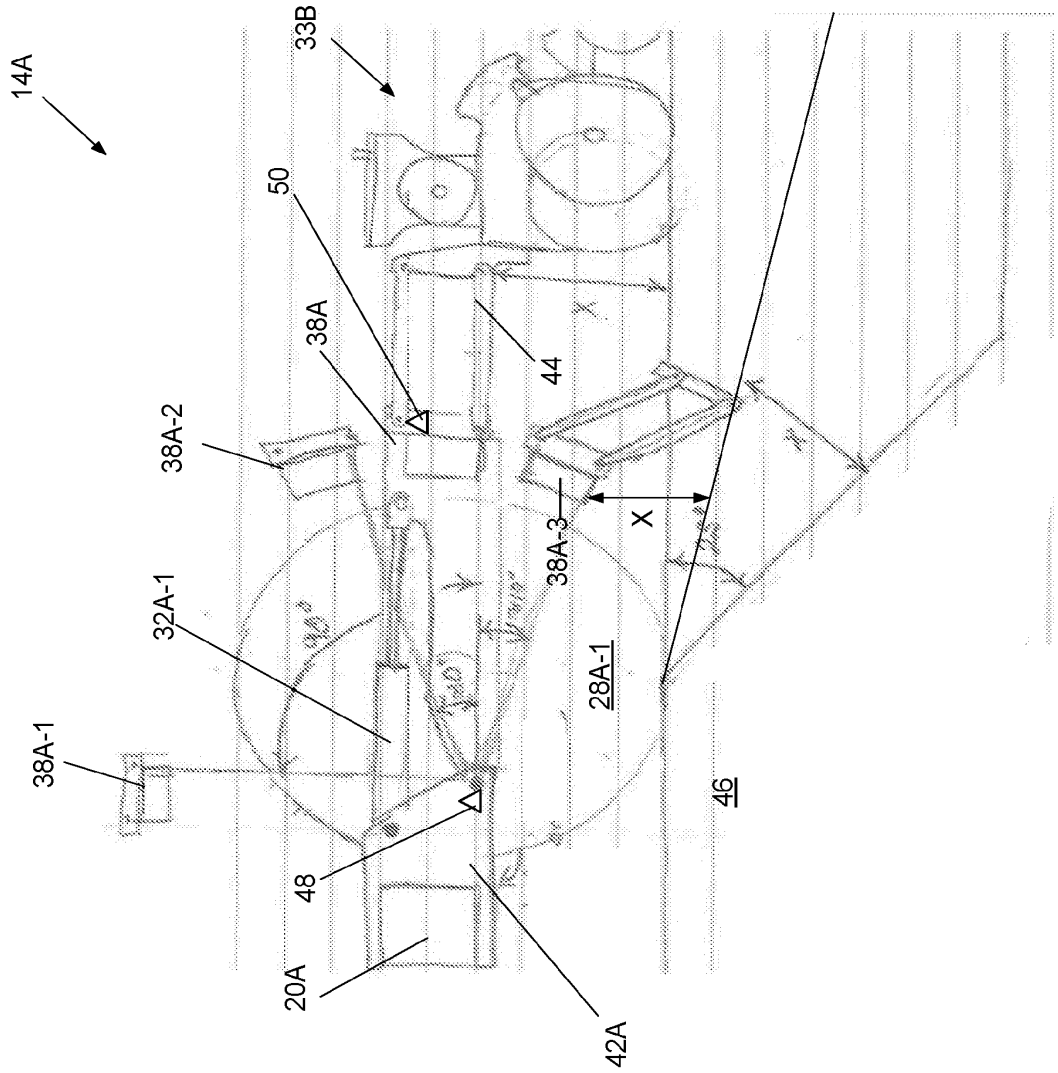


FIG. 3

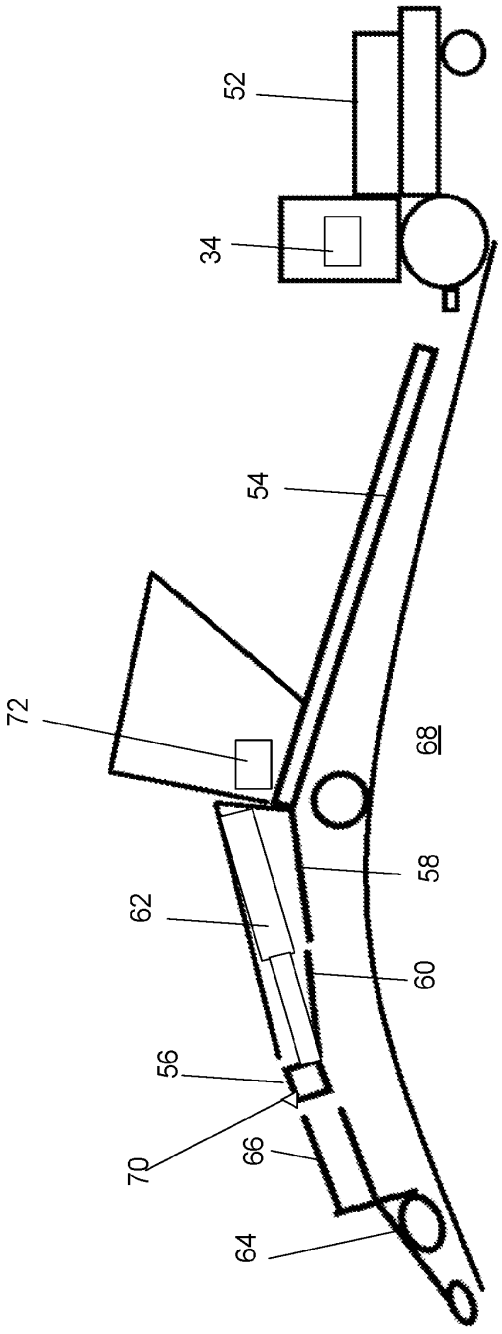


FIG. 4A

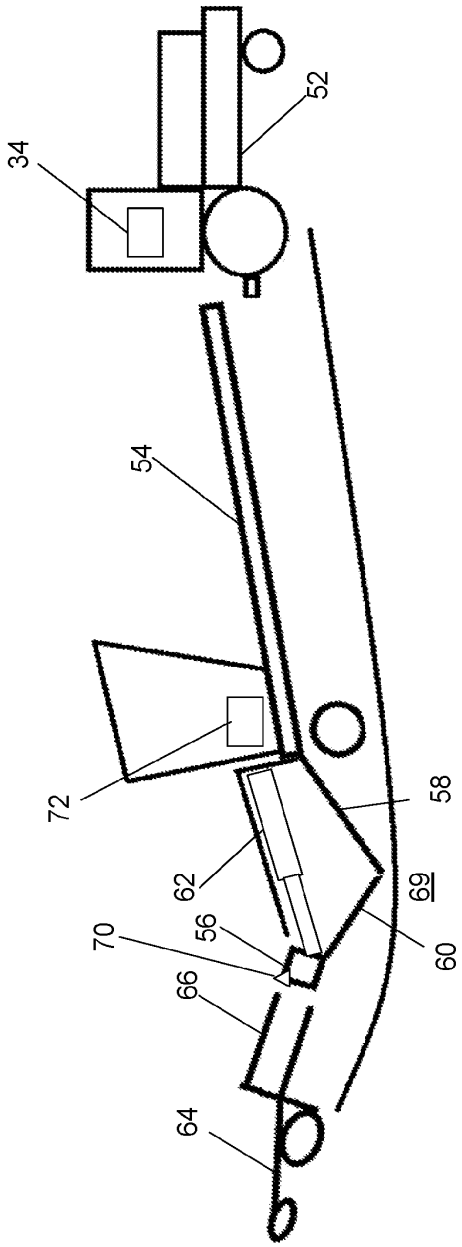


FIG. 4B

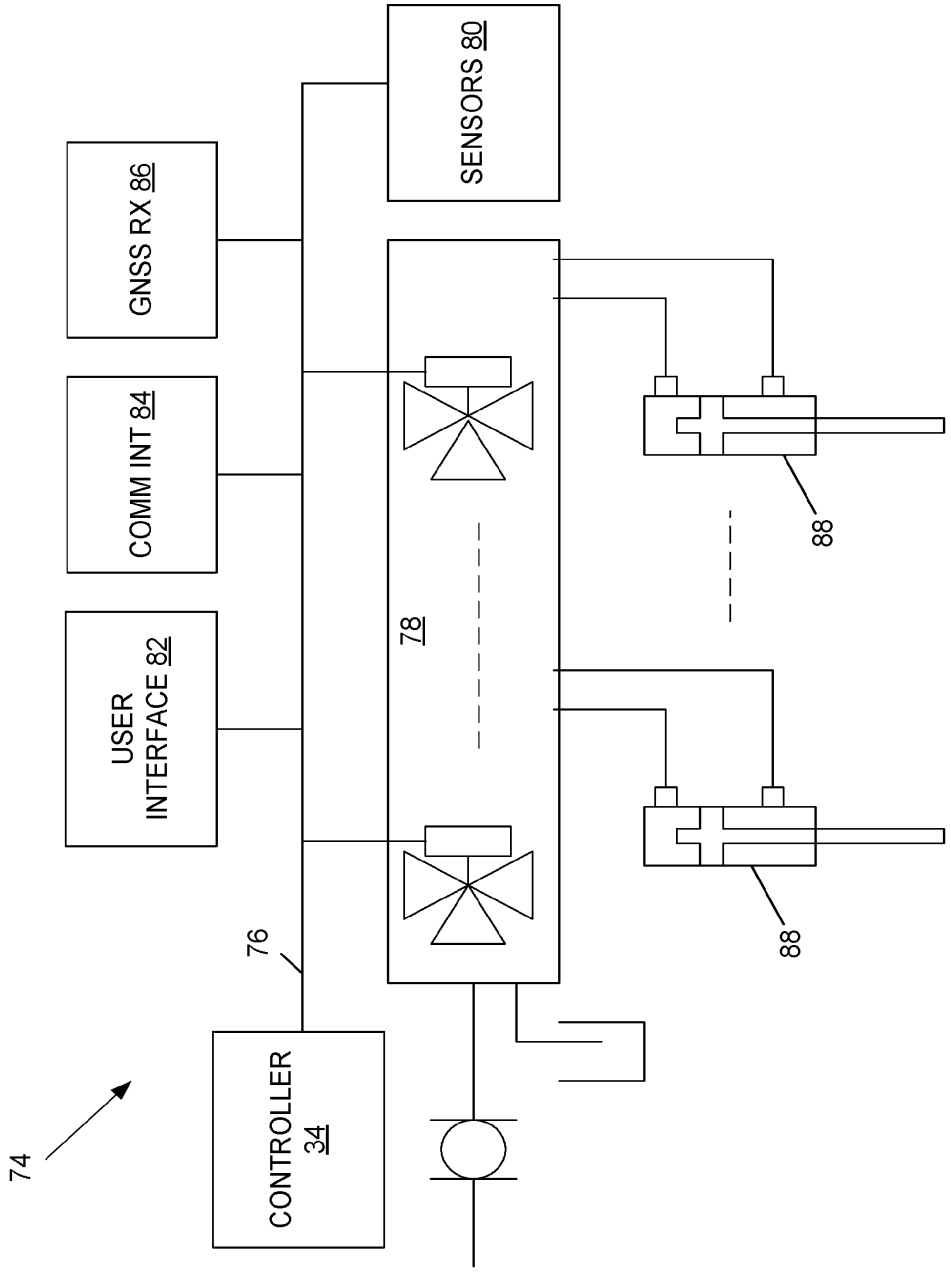

74
CONTROLLER 34
76
USER INTERFACE 82
COMM INT 84
GNSS RX 86
SENSORS 80
78
88
88

FIG. 5A

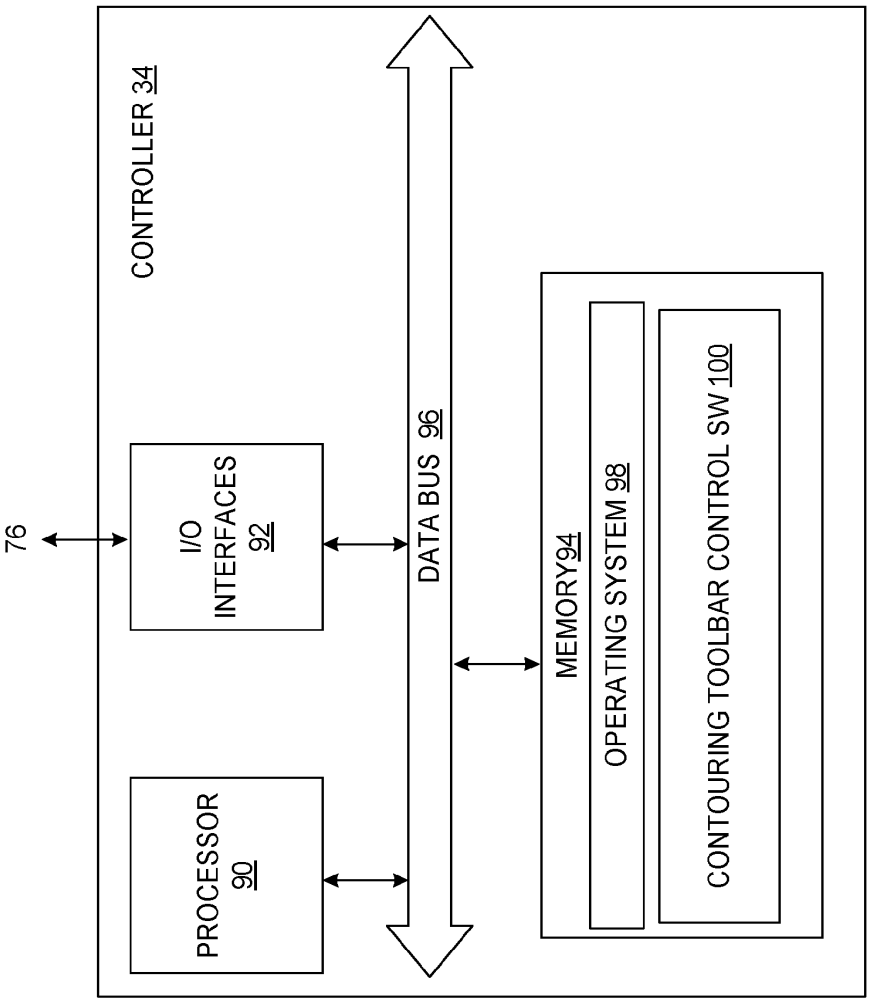

76
CONTROLLER 34
I/O INTERFACES 92
DATA BUS 96
PROCESSOR 90
MEMORY 94
OPERATING SYSTEM 98
CONTOURING TOOLBAR CONTROL SW 100

FIG. 5B

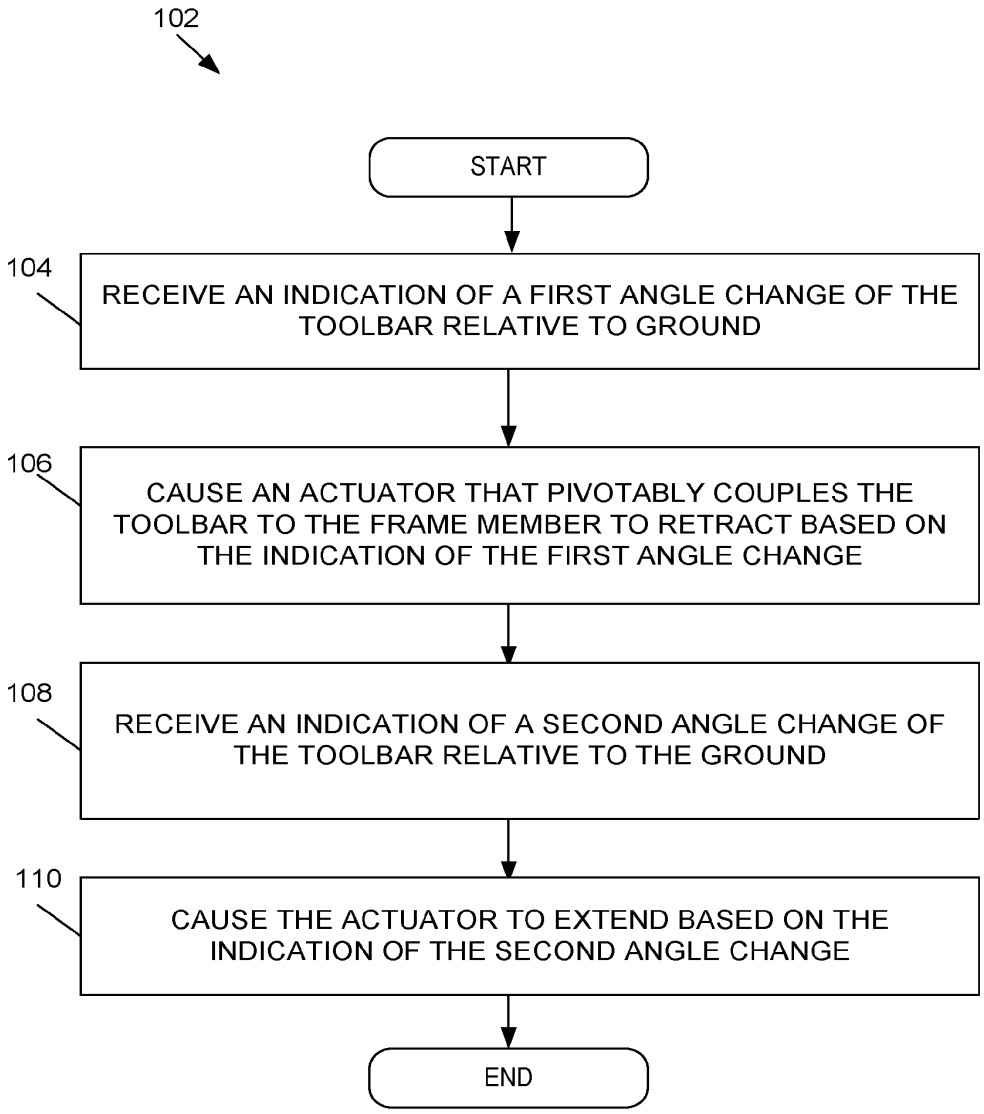

102
START
104
RECEIVE AN INDICATION OF A FIRST ANGLE CHANGE OF THE TOOLBAR RELATIVE TO GROUND
106
CAUSE AN ACTUATOR THAT PIVOTABLY COUPLES THE TOOLBAR TO THE FRAME MEMBER TO RETRACT BASED ON THE INDICATION OF THE FIRST ANGLE CHANGE
108
RECEIVE AN INDICATION OF A SECOND ANGLE CHANGE OF THE TOOLBAR RELATIVE TO THE GROUND
110
CAUSE THE ACTUATOR TO EXTEND BASED ON THE INDICATION OF THE SECOND ANGLE CHANGE
END

FIG. 6

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US16/40/US
	Application Number	
Title of Invention	IMPLEMENT CONTOURING TOOLBAR	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Benjamin	Anson	Fanshier	

Residence Information (Select One) • US Residency Non US Residency Active US Military Service

City	State/Province	Country of Residence
Hesston	KS	US

Mailing Address of Inventor:

Address 1	c/o AGCO Corporation
Address 2	420 W. Lincoln Boulevard

City	State/Province	Postal Code	Country
Hesston	KS	67062-0969	US

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Rex		Schertz	

Residence Information (Select One) ◉ US Residency Non US Residency Active US Military Service

City	State/Province	Country of Residence
Hesston	KS	US

Mailing Address of Inventor:

Address 1	c/o AGCO Corporation
Address 2	420 W. Lincoln Boulevard

City	State/Province	Postal Code	Country
Hesston	KS	67062-0969	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

PTO/AIA/14 (11-15)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US16/40/US
	Application Number	
Title of Invention	IMPLEMENT CONTOURING TOOLBAR	

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	88988		
Email Address	patents@agcocorp.com	Add Email	Remove Email

Application Information:

Title of the Invention	IMPLEMENT CONTOURING TOOLBAR		
Attorney Docket Number	US16/40/US	**Small Entity Status Claimed** ☐	
Application Type	Provisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	7	**Suggested Figure for Publication (if any)**	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	88988		

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US16/40/US
	Application Number	
Title of Invention	IMPLEMENT CONTOURING TOOLBAR	

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US16/40/US
	Application Number	
Title of Invention	IMPLEMENT CONTOURING TOOLBAR	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

PTO/AIA/14 (11-15)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US16/40/US
	Application Number	
Title of Invention	IMPLEMENT CONTOURING TOOLBAR	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	AGCO Corporation		
Mailing Address Information For Applicant:			
Address 1	4205 River Green Parkway		
Address 2			
City	Duluth	**State/Province**	GA
Country	US	Postal Code	30096
Phone Number		Fax Number	
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US16/40/US
	Application Number	
Title of Invention	IMPLEMENT CONTOURING TOOLBAR	

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IMPLEMENT CONTOURING TOOLBAR

TECHNICAL FIELD

[0001] The present disclosure is generally related to implements, and, more particularly, agricultural implements.

BACKGROUND

[0002] Implements, such as agricultural implements, are used to enable the engagement of tool attachments, including row units, with the soil for seeding, fertilizing, soil agitation, etc. As implements continue to get wider, they tend to have longer, rigid sections that do not handle uneven fields well. For instance, the field may comprise gullies and/or terraces that compromise the ability of the row units to properly operate in the field. As an example, when a planter encounters a terrace, frame wheels of the implement lift the row units up and out of the ground. Conversely, as the wheels go down the back of the terrace, the entire weight of the frame rests on the row units. In either case, possible detrimental results include insufficient crop yield due to seeds being planted too shallow or too deep.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] Many aspects of a contouring toolbar system of the present disclosure can be better understood with reference to the following drawings. The components in the drawings are not necessarily to scale, emphasis instead being placed upon clearly illustrating the principles of a contouring toolbar system. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the several views.

[0004] FIG. 1 is a schematic diagram that illustrates an example environment in which an embodiment of an example contouring toolbar system may be used.

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[0005] FIG. 2 is a schematic diagram that illustrates, in side elevation view, an embodiment of an example contouring toolbar system with the toolbar in a flat or zero angle position.

[0006] FIG. 3 is a schematic diagram that illustrates, in fragmentary, side elevation view, an embodiment of an example contouring toolbar system with an implement comprising a toolbar in various angular positions.

[0007] FIGS. 4A-4B are schematic diagrams that illustrate, in fragmentary side elevation view, example field contours that trigger activation of the actuators of an embodiment of an example contouring toolbar system.

[0008] FIG. 5A is a block diagram that illustrates an example control system for an embodiment of an example contouring toolbar system.

[0009] FIG. 5B is a block diagram that illustrates an example controller for the control system of FIG. 5A.

[0010] FIG. 6 is a flow diagram that illustrates an embodiment of an example contouring toolbar method.

DESCRIPTION OF EXAMPLE EMBODIMENTS

Overview

[0011] In one embodiment, a frame member; a toolbar coupled to the frame member, the toolbar parallel to, and rearward of, the frame member; a row unit coupled to the toolbar; and an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar based on a sensed position of the toolbar.

Detailed Description

[0012] Certain embodiments of a contouring toolbar system and method are disclosed that enable an implement with row units to navigate across uneven fields while controlling a relationship of a row unit toolbar to the ground independently of the

implement, frame-mounted wheels. In one embodiment, a contouring toolbar system comprises an actuator coupled between a frame member and a toolbar, the actuator retracted or extended based on the position of the toolbar as sensed by one or more sensors, which in turn maintains the coupled row units properly engaged with (e.g., seeding) the soil despite the contoured surfaces of the field. In some embodiments, the contouring toolbar system uses the sensed position of the toolbar to enable in-field planting operations, including lifting and turning at the end of the field.

[0013] Digressing briefly, most implement designs (e.g., planters) comprise a row unit toolbar that remains rigid as the implement moves over contoured field surfaces. When the implement is towed over a terrace, for instance, the row unit may be lifted off of the ground due to the rigid structures involved, resulting in a shallow or surface-level seed depth. In other instances, such as when the row unit is approaching a valley or gulley where the towing vehicle is at a higher elevation, the row unit may receive the entire weight load of the frame, resulting in a seed depth that is excessive and possibly causing damage to the row unit. In contrast, certain embodiments of a contouring toolbar system actively control the rotation of the row unit toolbar, adapting the rotation to follow the contoured field surfaces and hence always attempting to keep the row units engaged with the ground (e.g., by attempting to control the toolbar to be at a level position relative to the ground, or stated otherwise, maintain a relatively consistent elevation of the toolbar relative to ground).

[0014] Having summarized various features of certain embodiments of a contouring toolbar system of the present disclosure, reference will now be made in detail to the detailed description of a contouring toolbar system as illustrated in the drawings. While the disclosure is described in connection with these drawings, there is no intent to limit it to the embodiment or embodiments disclosed herein. Further, although the description identifies or describes specifics of one or more embodiments, such specifics are not

necessarily part of every embodiment, nor are all various stated advantages associated with a single embodiment. On the contrary, the intent is to cover all alternatives, modifications and equivalents included within the spirit and scope of a contouring toolbar system as defined by the appended claims. Further, it should be appreciated in the context of the present disclosure that the claims are not necessarily limited to the particular embodiments set out in the description.

[0015] Note that references hereinafter made to certain directions, such as, for example, "front", "rear", "left" and "right", are made as viewed from the rear of the implement looking forwardly.

[0016] Attention is now directed to FIG. 1, which is a schematic diagram that illustrates an example environment 10 in which an embodiment of a contouring toolbar system may be used. It should be appreciated by one having ordinary skill in the art, in the context of the present disclosure, that the environment 10 depicted in FIG. 1 is merely illustrative of one example environment, and that in some embodiments, other environments may be used. The example environment 10 includes a towing vehicle 12, in this example a tractor, towing an implement 14. The tractor 12 and implement 14 are depicted in fragmentary view. In some embodiments, other types of towing vehicles, including a self-propelled vehicle with an integrated implement (in lieu of a towed implement) or towing vehicles of other axle arrangements or other chassis configurations may be used, and hence are contemplated to be within the scope of the disclosure. The tractor 12 is coupled to the implement 14 using any known hitch and/or tongue assembly 16. The implement 14 may support equipment 18, which may include one or more product containers, control components, pumps, reservoirs, among other equipment used to dispense product and control functioning of the implement and/or its attachments. The implement 14 comprises a chassis that includes parallel frame members 20, 22 in fore and aft arrangement, respectively, when deployed (e.g., when the implement 14 is towed

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in the forward direction). In the depicted example, the implement 14 is extended in a transverse direction relative to the direction of field traversal. The implement 14 is segmented into wing sections 24 (e.g., 24A, 24B) and a center section 26 that supports the equipment 18 and trails directly behind the tractor 12. In some embodiments, the implement 14 may be towed in an orientation where the center section 26 is physically offset from the center of the tractor 12. Although not detailed in FIG. 1, the wing sections 24 are respectively coupled to the center section 26 in pivotal manner, enabling a folding in a plane occupied by the tractor 12 and implement 14 for narrow-profile transport. In some embodiments, the folding of the wings 24 may be achieved outside of the plane of the tractor 12 and implement 14 (e.g., folded upward above the plane and rearward). Coupled to the frame members 20 of the wing sections 24A, 24B and center section 26 are respective wheels 28 (e.g., 28A to frame member 20 of wing section 24A, 28B-28C to frame member 20 of center section 26, and 28D to frame member 20 of wing section 24B). Some embodiments of a contouring toolbar system may use additional wheels (e.g., in tandem, as duals, or otherwise) in the same or different positions, or arrange the wheels in different locations than shown. For instance, in some embodiments, the wheels 28 may not be disposed between the frame members 20, 22. However, in the depicted example, the wheels 28 are disposed between the frame members 20, 22. Each frame member 20, 22 comprises bracket arms 42 (not designated in FIG. 1, but shown in FIG. 2) and 30 (e.g., 30A-30F), respectively, that pivotably couple (e.g., via hinged joint to bracket arms of the frame member 20) the frame members 22 to the frame members 20.

[0017] Attached at the bracket arms 30A, 30B, 30E, 30F of the wing sections 24A, 24B are actuators 32 (e.g., 32A, 32B, 32E, and 32F), and attached to bracket arms 30C, 30D of the center section 26 are actuators 32 (e.g., 32C, 32D). Note that the location and/or quantity of bracket arms 30 and/or actuators 32 depicted in FIG. 1 is for illustration of

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one embodiment, and that in some embodiments, different and/or additional quantities and/or locations may be used. The actuators 32 may be configured as single rod hydraulic actuators (e.g., a linear-acting, piston and rod assembly, though in some embodiments, rotary actuation may be used). In some embodiments, the actuators 32 may be configured as either pneumatic, electric, magnetic, or electromagnetic actuators. The actuators 32 are configured to rotate the frame members 22 (e.g., the toolbar) of the wing and center sections 24, 26 to/from any position along a range of positions throughout an approximately one hundred ten (110) degree range, though in some embodiments, the range may be more or less. For instance, for field work and transport operations, the actuators 32 may rotate the frame members 22 relative to the frame members 20 to angular positions of zero (0) degrees (e.g., working a level or even surface of the field), approximately 20-40 degrees (e.g., raising the frame member 22 to clear a minimum recommended headlands elevation or a maximum recommended headlands rotation, respectively), and approximately 90 degrees (e.g., for narrow transport). Note that the angular position is construed relative to a horizontal plane of the frame members 20. The actuators 32 are also configured to rotate the frame members 22 of the wing and center sections 24, 26 to angular positions below the center or zero degree position. For instance, in one embodiment, the actuators 32 may be extended (e.g., the rods extended) to an angular position of approximately 10 degrees below the zero degree reference (below level), such as to accommodate hills traversals, or even greater angles (as suggested by the 25 degree angle in FIG. 3, described below. In other words, the angular span of positions to which the frame member 22 may be rotated relative to the frame member 20 comprises an obtuse angle (e.g., over 90 degrees).

[0018] Removeably attached to the frame members 22 and arranged rearward to the frame members 22 are soil working tools 33, including row units that seed, fertilize,

and/or agitate the soil. Though shown completely rearward of the frame members 22, in some embodiments, the row units 33 may be alternately staggered, with the row units 33 position completely rearward and slightly forward and rearward of the frame member 22. Other configurations may be used, as should be appreciated by one having ordinary skill in the art.

[0019] The tractor 12 also comprises a controller 34 that causes actuation of the actuators 32 based on operator input, software and/or device input, and/or sensor signals as explained further below. For instance, where the actuators 32 are configured as hydraulic cylinders, hydraulic fluid control may be achieved via a control component 36 that comprises one or more manifolds, each comprising one or more control valves that control a state of the hydraulic cylinders 32 (e.g., control the change in pressure and/or change in flow rate of hydraulic fluid through the cylinders). Actuation of the control component 36 may be achieved wirelessly or via wired connection (e.g., Isobus) according to commands from the controller 34.

[0020] Note that the contouring toolbar system may include the components described for the entire environment 10 in some embodiments, or a subset of the described components in some embodiments.

[0021] Having generally described an example environment 10 in which an embodiment of a contouring toolbar system may be used, attention is directed to FIG. 2, which illustrates an example implement 14 with a level or zero angle position of the frame member 22 relative to the frame member 20. In the depicted example, the wing sections 24 are folded forward relative to the center section 26. Only one row unit 33A is depicted as attached to the frame member 22, with the understanding that additional row units would typically be attached along the frame members 22. Referring to wing section 24A in particular with primary focus on the components associated with the actuator 32A, with the understanding that a similar description applies to the rotational

components of the rest of the wing section 24A, the wing section 24B, and the center section 26 but omitted here for brevity, the frame member 22 comprises a toolbar 38. The toolbar 38 may be rectangular in shape, and comprises in one embodiment on the rearward side, tool brackets 40 that are uniformly spaced along the toolbar 38. The tool brackets 40 are secured to the toolbar 38 according to any known securement mechanism, including weld, bolts, etc. The tool brackets 40 facilitate attachment of respective soil working tools, such as row units 33A. On the opposing side of the toolbar 38 are the bracket arms 30, which extend forwardly from the toolbar 38. The bracket arms 30 couple via a hinged joint to rearward extending bracket arms 42 extending from the frame member 20.

[0022] Enabling rotation of the frame members 20, 22 are the plural actuators 32 (e.g., 32A). In one embodiment, the actuator 32A (as with the other actuators 32) is attached to an upper portion of the frame member 20 (e.g., at or proximal to the upper portion of the bracket arm 42) and the bracket arm 30 opposite the toolbar 38. Other locations may be used as long as the rotation of the toolbar 38 is achieved relative to the frame member 20. In FIG. 2, the actuators 32 have rotated the toolbar 38 to a zero (0) degree angle relative to the horizontal plane of a transverse component of the frame member 20. In this orientation, row units 33A may be operational and engaged with the soil.

[0023] Referring now to FIG. 3, shown is an embodiment of an example contouring toolbar system with an implement 14A comprising a toolbar 38A in various angular positions. The implement 14A shown in FIG. 3 may be similarly structured and configured as implement 14 shown in FIGS. 1-2. The implement 14A is depicted diagrammatically with the frame member 20A comprising a bracket arm 42A, the bracket arm 42A pivotably coupled to the toolbar 38A (e.g., via a hinged connection at the bracket arm 30 (FIG. 2) and the bracket arm 42). The actuator 32A-1 provides for retracting and extending movements that cause the toolbar 38A to rotate relative to the

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frame member 20A. The toolbar 38A is coupled to the row unit 33B via a linkage 44. The linkage 44 is comprised of a parallelogram structure, as is known, and permits limited parallelogram motion between the toolbar 38A and the row unit 33B. The wheel 28A-1 is coupled to the frame member 20 in known manner, similar to that shown in FIG. 2, though as described above, some embodiments may use different chassis configurations and hence are contemplated to be within the scope of the disclosure. The implement 14A is shown resting on a field 46, the field 46 shown as a level surface and also angled to represent where the actuator 32A-1 needs to drop (extend) the toolbar 38A to follow the varying contours of the field surface. One of the points FIG. 3 is illustrating is that an embodiment of a contouring toolbar system is persistently attempting to control the "X" dimension to keep the row unit 33B engaged with the ground (e.g., to enable proper seeding, agitation, etc.). The "X" dimension is referenced relative to a location proximal to the row unit connection to the toolbar 38A (e.g., via the parallelogram linkage connection) relative to the ground, and hence corresponds to the toolbar position relative to the ground.

[0024] The toolbar 38A (38A in zero-angle position) is shown in multiple angular positions, including toolbar 38A-1, toolbar 38A-2, and toolbar 38A-3. At toolbar 38A-1, the actuator 32A-1 has raised (e.g., via full retraction of the corresponding rod) the toolbar 38A-1 to approximately 90 degrees (e.g., relative to a level surface or a longitudinal axis of the frame member 20A) for narrow transport.

[0025] At toolbar 38A-2, the actuator 32A-1 has raised the toolbar 38A-2 to approximately 10 degrees relative to a level surface or a longitudinal axis of the frame member 20A. Such actuation may occur, for instance, if the row unit 33B was traversing the backside of a terrace to attempt to control the X dimension relative to the ground surface to keep the row unit 33B engaged (which also may prevent excessive loads on the row unit 33B). Also, for field operations, an intermediate position of the toolbar 38A

proximal to that depicted in FIG. 3 for toolbar 38A-2 may be sensed for permitting headland turning. For instance, the toolbar 38A may be raised to approximately 20-30 degrees, the rotation sensed to enable the controller 34 to stop at that operational position.

[0026] At toolbar 38A-3, the actuator 32A-1 has lowered the toolbar 38A-3 below zero degrees (e.g., approximately 10 degrees below the zero angular position). Such an actuation may occur if the row unit 33B was traveling on the upside of a hill as in the depicted example (the row unit 33B not actually shown traversing the slope of 25 degrees for ease of illustration). In other words, the actuation serves to attempt to maintain the X dimension of the toolbar 38A (e.g., and similarly, the row unit 33B), which in turn also avoids lifting the row unit 33B off of the surface of the field 46. As set forth above, additional actuation may be performed for even greater changes in traversed field contour (e.g., 25 degrees) in order to control the "X" dimension. As illustrated in FIG. 3, the toolbar position is adjusted to attempt to maintain a level operating position relative to the contour of the surface and to enable proper engagement of the row unit 33B with the field 46.

[0027] In one embodiment, the control of the actuation is based on one or more sensors that sense the position of the toolbar 38A. The sensors may be disposed for each row unit 33B of a planter, or one or more sensors may be used for all of the row units 33B. In general, to enable the toolbar 38A (and hence toolbar 38A) to follow the contour of the field, sensor information is received about the (relative) position of the toolbar 38A (and by extension, the relative position of the row unit 33B) relative to the ground. A row unit sensor, such as sensor 50, is used for the contouring operation. In one embodiment, at least one row unit sensor 50 is used, though in some embodiments, there may be a row unit sensor 50 per every row unit 33B. Further, toolbar rotation for field operations may also rely on sensor information. For instance, at the end of a "pass", the row units 33B

are lifted to a headland position, the towing vehicle turns around, and the row units 33B are lowered again to engage the field for the next pass. This operation is referred to as headland turning, which involves transitioning from a contouring or field operation position of the toolbar 38A (and hence row units 33B) to a pre-configured (or in some embodiments, operator-configured) intermediate angle of the toolbar 38A. Headland turning benefits from the use of sensor information about the toolbar position relative to the frame 20A. In one embodiment, one or more sensors, including sensor 48, may be used to provide this information. There may be a single sensor 48 corresponding to plural row units, or multiple sensors 48 (e.g., per row unit 33B). The sensor 48 may also be used for enabling transport, such as triggering an electronic stop (from signaling of the controller 34) when the toolbar 38A has reached the transport position (e.g., approximately 90 degrees).

[0028] The sensor 48 may be positioned proximal to the pivot point of the bracket arm 42 of the frame member 20 and where the toolbar 38A couples to the bracket arm 42. In this position, the sensor 48 senses the angular position and/or change in angular position between the toolbar 38A and the frame member 20. The sensor 50 may be located at the pivot point between the linkage 44 and the toolbar 38A, and used to sense the position of the toolbar 38A (and hence the position of the row unit 33B) relative to the ground. That is, the contouring toolbar system attempts to follow the contour of the field 46 (controlling the "X" dimension) as pivoting areas begin to move in response to the changes in field surfaces. In short, the contouring toolbar system attempts to keep the "X" dimension or the toolbar 38A relatively constant relative to the ground and also control the travel of the toolbar 38A in a manner that keeps the row unit 33B engaged with the ground.

[0029] In one embodiment, the sensors 48 and 50 may each be configured as a rotary encoder that provides an angle value for every programmed amount of sensed rotation.

For instance, the rotary encoder may be optically-based, and for every detected rotation or click (e.g., assuming a single rotation or "click' per single degree, though other resolutions may be used), the controller 34 (FIG. 1) can track based on a signal from the sensors 48, 50 at what angle the toolbar 38A has rotated relative to the frame 20A (from sensor 48) and the ground (from sensor 50).

[0030] For contouring control, the controller 34 may be programmed to trigger actuation of the actuator 32A-1 based on a sensed (e.g., from sensor 50) defined threshold degree value away from a zero degree reference, providing a buffer to excessive actuations. In some embodiments, the rate of rotation may also trigger the controller 34 to communicate the speed of actuation. For instance, at a single click of the sensor 50, the controller 34 may communicate an actuation speed of a defined percentage (e.g., 1%) or value, and a 5 degree rotation may trigger communication of a faster speed (e.g., 50%) to serve in an anticipatory manner to avoid wide or rapid stroke of the actuator 32A-1.

[0031] In some embodiments, the sensors 48 and/or 50 may be configured as non-contact type, electromagnetic sensors, including ultrasonic, radar, or lidar type sensors, or as a combination of angular position and non-contact types. For instance, the electromagnetic sensors may detect the position of the ground (e.g., via transmittal to and reflection from the ground) relative to the toolbar 38A and communicate a signal to the controller 34 to cause adjustment of the toolbar 38A to control (e.g., maintain) the toolbar-to-ground dimension X substantially constant. Note that in some embodiments, the electromagnetic sensors may be located in other locations, including at the row unit 33B. the electromagnetic sensors may be configured to detect an absolute elevation of the toolbar 38A relative to ground or a change in elevation relative to ground.

[0032] Attention is now directed to FIGS. 4A-4B, which illustrate, diagrammatically, example operations of an embodiment of a contouring toolbar system. Shown is a tractor 52 coupled to a planter frame 54. The planter frame 54 is pivotably coupled to a

toolbar 56 via bracket arms 58, 60. Coupled between bracket arms 58, 60 is actuator 62. The toolbar 56 is further coupled to the row unit 64 via linkage 66. Note that the planter frame 54 may be similar to the frame member 20 (FIG. 1), and the bracket arms 58, 60 may be similar to bracket arms 42 and 30 (FIGS. 1-2). Also, the toolbar 56 may be similar to toolbar 38 (FIG. 3), and the row unit 64 and linkage 66 may be similar to the row unit 33 (FIGS. 1-2) and linkage 44 (FIG. 3), respectively. Referring to FIG. 4A, the planter frame 54 is shown commencing a downward slope of a hill 68. An angle sensor 70 positioned proximal to the toolbar 56 and row unit 64 and senses a change in position of the toolbar 56 (and hence row unit 64) relative to the ground and signals to the controller 34. The controller 34, in turn, processes the received signal and signals to a control component 72 to change a state of the actuator 62 (e.g., change in pressure and/or fluid flow in the case of a hydraulic actuator) according to the determined angular change, resulting in the rod of the actuator 62 extending to rotate the toolbar 56 downward to adjust to the change in contour. Note that in conventional systems, the row unit may be lifted off of the ground due to the rigid structures involved, resulting in insufficient planting depth.

[0033] Referring to FIG. 4B, the planter frame 54 is traversing up a slope while the row unit 64 is heading down to a valley 69 or gulley. The sensor 70 senses the change in angular position of the toolbar 56 (and row unit 64) relative to the ground and signals to the controller 34. The controller 34 in turn signals to the control component 72 according to the determined angular change, resulting in the rod of the actuator 62 being retracted to cause the toolbar 56 to rotate up to adjust to the change in contour. In a conventional system, the row unit may lose engagement with the field, resulting in the deposit of seed at too much depth, affecting yield negatively. Also, the row unit in a conventional system may be exposed to excessive forces (e.g., possibly causing the row unit to damage or break off).

[0034] Reference is now made to FIG. 5A, which illustrates an embodiment of an example control system 74 used for controlling operations of the toolbar rotations for an embodiment of a contouring toolbar system. It should be appreciated within the context of the present disclosure that some embodiments may include additional components or fewer or different components, and that the example depicted in FIG. 5A is merely illustrative of one embodiment among others. The control system 74 may be located entirely on the implement (e.g., implement 14, FIG. 1), distributed among the towing vehicle (e.g., tractor 12, FIG. 1) and the implement, or among additional devices (e.g., remote control). Further, though depicted using a single controller 34, in some embodiments, the control system 74 may be comprised of plural controllers similarly configured to controller 34. In the depicted embodiment, the controller 34 is coupled via one or more networks, such as network 76 (e.g., a CAN network or other network, such as a network in conformance to the ISO 11783 standard, also referred to as "Isobus"), to control components 78, one or more sensors 80, a user interface 82, a communications interface (COMM INT) 84, and a global navigation satellite systems (GNSS) receiver 86. The control components 78 may be configured similarly to control components 36 (FIG. 1) and 72 (FIG. 4A). The sensors 80 may be configured similarly to sensors 48, 50 (FIG. 3), and/or 70 (FIG. 4A). Note that control system operations are primarily disclosed herein in the context of control via the single controller 34, with the understanding that additional controllers may be involved in one or more of the disclosed functionality in some embodiments.

[0035] The control components 78 may comprise a manifold comprising one or more or a combination thereof of control valves, air valves, switches, relays, solenoids, motors, etc., to cause actuation of the actuators (e.g., actuator 32, FIG. 2) that control the rotation of the toolbars (e.g., toolbar 38, FIG. 2). In the depicted example, the control components 78 comprises one or more multi-position (e.g., 3-position) hydraulic control

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valves with coupled solenoids, the solenoids receiving signaling from the controller 34 and causing movement of a spool or poppet(s) of the control valves. The control valves in turn regulate the flow into and out of actuators that, in one embodiment, comprise linear acting, rod and single piston-type hydraulic cylinders 88. The regulation of the flow and/or pressure across the piston enables the retraction or extension of the rod as needed. As suggested above, the control technology may be comprised of pneumatic, electric, magnetic, or electromagnetic.

[0036] The sensors 80 may be comprised of angle positioning sensors (e.g., rotary encoders, including optical based or other electromagnetic frequencies), or non-contact type sensors, including radar, acoustic, lidar, among others. In some embodiments, a combination of these types of sensors may be used. The sensors 80 are used to determine the position of the row unit toolbar, including via the determination of the distance between the toolbar and the ground surface and/or the angular position of the toolbar relative to the frame member (e.g., frame member 20, FIG. 1).

[0037] The user interface 82 may include one or more components, including one or any combination of a keyboard, mouse, microphone, touch-type or non-touch-type display device (e.g., display monitor or screen), joystick, steering wheel, FNR lever, and/or other devices (e.g., switches, immersive head set, etc.) that enable input and/or output by an operator. For instance, in some embodiments, the user interface 82 may be used to present on a display screen implement control options (e.g., drop the toolbar for engagement of the row units with the soil, raise the toolbar for headlands, raise the toolbar for transport, etc.) for the operator to choose from, and/or the user interface 82 may provide feedback of when these actions are taken or about to be taken when performed automatically (e.g., providing an operator the opportunity to reject or acknowledge or merely observe). In some embodiments, the feedback may be in the form of recommendations to the operator for taking certain actions. In one embodiment,

a visual of the implement may be presented on the screen, with the sensor data communicated in the form of data and/or a visual of the movement of the toolbar relative to the field contour. In some embodiments, the functions of manually rotating the toolbar to various operational positions may be performed via actuation of a switch, lever, handle, etc., or verbally commanded.

[0038] The communications interface 84 may comprise a wireless network interface module (e.g., including an RF and/or cellular modem) for wireless communication among other devices of the towing vehicle/implement combination or with remote devices (e.g., external from the implement and towing vehicle). The communications interface 84 may work in conjunction with communication software (e.g., including browser software) in the controller 34, or as part of another controller coupled to the network 76 and dedicated as a gateway for wireless communications with other devices or networks. The communications interface 84 may comprise MAC and PHY components (e.g., radio circuitry, including transceivers, antennas, etc.), as should be appreciated by one having ordinary skill in the art.

[0039] The GNSS receiver (GNSS RX) 86 may be comprised of a GPS receiver, for instance, to receive location coordinates of the towing vehicle and/or implement. The GNSS receiver 86 may function in cooperation with field maps stored locally in the controller 34 (or accessed from a remote server) to enable detection of headlands, roads, field entrances, and/or locations for surface features (e.g., hills, gullies), etc. For instance, the use of locations of surface features may be used in part to enable the controller 34 to improve anticipation of the extent (e.g., speed) of actuation for rotating the toolbar.

[0040] FIG. 5B further illustrates an example embodiment of the controller 34. One having ordinary skill in the art should appreciate in the context of the present disclosure that the example controller 34 is merely illustrative, and that some embodiments of

controllers may comprise fewer or additional components, and/or some of the functionality associated with the various components depicted in FIG. 5B may be combined, or further distributed among additional modules, in some embodiments. It should be appreciated that, though described in the context of residing in a towing vehicle (e.g., the tractor 52 (FIG. 4A), in some embodiments, the controller 34, or all or a portion of its corresponding functionality, may be implemented at the implement (e.g., implement 14, FIG. 1) or in a computing device or system located external to the tractor and/or implement. Referring to FIG. 5B, with continued reference to FIG. 5A, the controller 34 or electronic control unit (ECU) is depicted in this example as a computer, but may be embodied as a programmable logic controller (PLC), field programmable gate array (FPGA), application specific integrated circuit (ASIC), among other devices. It should be appreciated that certain well-known components of computers are omitted here to avoid obfuscating relevant features of the controller 34. In one embodiment, the controller 34 comprises one or more processors (also referred to herein as processor units or processing units), such as processor 90, input/output (I/O) interface(s) 92, and memory 94, all coupled to one or more data busses, such as data bus 96. The memory 94 may include any one or a combination of volatile memory elements (random-access memory RAM, such as DRAM, and SRAM, etc.) and nonvolatile memory elements (e.g., ROM, Flash, hard drive, EPROM, EEPROM, CDROM, etc.). The memory 94 may store a native operating system, one or more native applications, emulation systems, or emulated applications for any of a variety of operating systems and/or emulated hardware platforms, emulated operating systems, etc.

[0041] In the embodiment depicted in FIG. 5B, the memory 94 comprises an operating system 98 and contouring toolbar control software (SW) 100. It should be appreciated that in some embodiments, additional or fewer software modules (e.g., combined functionality) may be deployed in the memory 94 or additional memory. For instance,

the memory 94 may also include browser software and/or communications software. In some embodiments, a separate storage device may be coupled to the data bus 96, such as a persistent memory (e.g., optical, magnetic, and/or semiconductor memory and associated drives).

[0042] The contouring toolbar control software (SW) 100 receives input from the user interface 82 (via the I/O interfaces 92 and network 76) and sensor input from the sensors 80 (via the I/O interfaces 92 and network 76). In some embodiments, the contouring toolbar control software (SW) 100 may receive additional input, including location coordinates from the GNSS receiver, such as to identify certain surface features, headlands, and/or roads to trigger certain toolbar rotations. As suggested above, the sensor input is converted to an actuation signal (including a magnitude and optionally a rate), which is used to cause a suitable stroke to meet the required compensatory motion by the actuator (e.g., cylinders 88) to adjust the toolbar rotation. In some embodiments, operator input at the user interface 82 is also communicated and translated to an actuation signal to maneuver the toolbar to an appropriate position (e.g., to raise the toolbar at a headland, for narrow transport, etc.). The contouring toolbar control software (SW) 100 also provides user interface functionality to provide feedback of certain toolbar rotations, with or without the ability for the operator to intervene as explained previously.

[0043] Execution of the contouring toolbar control software (SW) 100 may be implemented by the processor 90 under the management and/or control of the operating system 98. The processor 90 may be embodied as a custom-made or commercially available processor, a central processing unit (CPU) or an auxiliary processor among several processors, a semiconductor based microprocessor (in the form of a microchip), a macroprocessor, one or more application specific integrated circuits (ASICs), a plurality of suitably configured digital logic gates, and/or other well-known electrical

configurations comprising discrete elements both individually and in various combinations to coordinate the overall operation of the controller 34.

[0044] The I/O interfaces 92 provide one or more interfaces to the network 76 and other networks. In other words, the I/O interfaces 92 may comprise any number of interfaces for the input and output of signals (e.g., analog or digital data) for conveyance of information (e.g., data) over the network 76. The input may comprise input by an operator (local or remote) through the user interfaces 82 and input from signals carrying information from one or more of the components of the control system 74, as explained above.

[0045] When certain embodiments of the controller 34 are implemented at least in part with software (including firmware), as depicted in FIG. 5B, it should be noted that the software can be stored on a variety of non-transitory computer-readable medium for use by, or in connection with, a variety of computer-related systems or methods. In the context of this document, a computer-readable medium may comprise an electronic, magnetic, optical, or other physical device or apparatus that may contain or store a computer program (e.g., executable code or instructions) for use by or in connection with a computer-related system or method. The software may be embedded in a variety of computer-readable mediums for use by, or in connection with, an instruction execution system, apparatus, or device, such as a computer-based system, processor-containing system, or other system that can fetch the instructions from the instruction execution system, apparatus, or device and execute the instructions.

[0046] When certain embodiment of the controller 34 are implemented at least in part with hardware, such functionality may be implemented with any or a combination of the following technologies, which are all well-known in the art: a discrete logic circuit(s) having logic gates for implementing logic functions upon data signals, an application

specific integrated circuit (ASIC) having appropriate combinational logic gates, a programmable gate array(s) (PGA), a field programmable gate array (FPGA), etc.

[0047] Having described some example embodiments of a contouring toolbar system, it should be appreciated in view of the present disclosure that one embodiment of a computer-implemented method for an implement that comprises a toolbar that has row units secured thereto, the method for adjusting a rotation of the toolbar based on a contour of a field on which the implement traverses, the method denoted as method 102 and illustrated in FIG. 6, comprises, at a controller (e.g., controller 34, FIG. 5B): receiving an indication of a first angle change of the toolbar relative to ground (104); causing an actuator that pivotably couples the toolbar to the frame member to retract based on the indication of the first angle change (106); receiving an indication of a second angle change of the toolbar relative to the ground (108); and causing the actuator to extend based on the indication of the second angle change (110).

[0048] Any process descriptions or blocks in flow diagrams should be understood as representing modules, segments, or portions of code which include one or more executable instructions for implementing specific logical functions or steps in the process, and alternate implementations are included within the scope of the embodiments in which functions may be executed out of order from that shown or discussed, including substantially concurrently or in reverse order, depending on the functionality involved, as would be understood by those reasonably skilled in the art of the present disclosure.

[0049] It should be emphasized that the above-described embodiments of a contouring toolbar system are merely possible examples of implementations, merely set forth for a clear understanding of the principles of the contouring toolbar system. Many variations and modifications may be made to the above-described embodiment(s) of the contouring toolbar system without departing substantially from the spirit and principles of the

disclosure. All such modifications and variations are intended to be included herein within the scope of the disclosure and protected by the following claims.

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CLAIMS

At least the following is claimed:

1. A system, comprising:

a frame member;

a toolbar coupled to the frame member, the toolbar parallel to, and rearward of, the frame member;

a row unit coupled to the toolbar; and

an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar based on a sensed position of the toolbar.

2. The system of claim 1, further comprising a first sensor coupled to the toolbar, the first sensor configured to sense a position of the toolbar relative to ground, the position of the toolbar corresponding to a position of the row unit relative to the ground.

3. The system of claim 2, further comprising a second sensor coupled to the frame member, the second sensor configured to sense an angle of the toolbar relative to the frame member.

4. The system of claim 3, further comprising a controller, the controller configured to receive first and second signals from the first and second sensors and cause actuation of the actuator based on the first and second signals.

5. The system of claim 4, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

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6. The system of claim 5, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

7. The system of claim 4, wherein the controller is further configured to cause adjustment of a rate of rotation based on the first signals from the first sensor.

8. The system of claim 2, further comprising a controller, the controller configured to receive a signal from the first sensor and cause actuation of the actuator based on the signal.

9. The system of claim 8, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

10. The system of claim 9, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

11. The system of claim 8, wherein the controller is further configured to cause adjustment of a rate of rotation based on the signal from the first sensor.

12. The system of claim 1, wherein the sensed position is relative to a field surface, further comprising one or more electromagnetic sensors coupled to the frame member, the toolbar, or a combination of the frame member and the toolbar, the one or more

electromagnetic sensors configured to sense an absolute elevation or change in elevation between the field surface and the toolbar or a combination of both the frame member and the toolbar.

13. The system of claim 12, further comprising a controller, the controller configured to receive one or more signals from the one or more electromagnetic sensors and cause actuation of the actuator based on the one or more signals.

14. The system of claim 13, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

15. The system of claim 14, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

16. The system of claim 13, wherein the controller is further configured to cause adjustment of a rate of rotation based on the one or more signals from the one or more electromagnetic sensors.

17. The system of claim 12, wherein the one or more electromagnetic sensors comprise ultrasonic, lidar, or radar sensors.

18. The system of claim 1, wherein the actuator is configured to rotate the toolbar throughout an obtuse angle range.

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19. A control system for an implement comprising a frame member and a toolbar rearward of and parallel to the frame member, wherein secured to the toolbar are plural row units, the control system comprising:

a controller;

one or more sensors configured to sense a position of the toolbar; and

an actuator coupled between the frame member and the toolbar, wherein the controller is configured to receive a signal or signals from the one or more sensors indicating the position and cause the actuator to rotate the toolbar based on the sensed position of the toolbar.

20. A computer-implemented method for an implement that comprises a toolbar that has row units secured thereto, the method for adjusting a rotation of the toolbar based on a contour of a field on which the implement traverses, the method comprising:

at a controller:

receiving an indication of a first angle change of the toolbar relative to ground;

causing an actuator that pivotably couples the toolbar to the frame member to retract based on the indication of the first angle change;

receiving an indication of a second angle change of the toolbar relative to the ground; and

causing the actuator to extend based on the indication of the second angle change.

ABSTRACT OF THE DISCLOSURE

In one embodiment, a frame member; a toolbar coupled to the frame member, the toolbar parallel to, and rearward of, the frame member; a row unit coupled to the toolbar; and an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar based on a sensed position of the toolbar.

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Electronic Acknowledgement Receipt	
EFS ID:	27814751
Application Number:	62435118
International Application Number:	
Confirmation Number:	4632
Title of Invention:	IMPLEMENT CONTOURING TOOLBAR
First Named Inventor/Applicant Name:	Benjamin Anson Fanshier
Customer Number:	88988
Filer:	David Rodack/Alison Anderson
Filer Authorized By:	David Rodack
Attorney Docket Number:	US16/40/US
Receipt Date:	16-DEC-2016
Filing Date:	
Time Stamp:	09:56:29
Application Type:	Provisional

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$260
RAM confirmation Number	121616INTEFSW09573900
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Drawings-only black and white line drawings	00411768.PDF	545495 eca7f1b24097ac2e1c616e4669affeb5c9740311	no	7
Warnings:					
Information:					
2	Application Data Sheet	00412020.PDF	1823114 51243f4073ee97644547238f044f5b5022bf133f	no	8
Warnings:					
Information:					
3		00412053.PDF	129318 dd1035ff91b6dc732825720e9bbd7f3e0e98bf99	yes	26

Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification	1	21
Claims	22	25
Abstract	26	26

Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	29752 caba6081894f99852a3296cd754a4734927ebbde	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	2527679		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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DOCUMENT MADE AVAILABLE UNDER THE PATENT COOPERATION TREATY (PCT)

International application number:		**PCT/IB2017/001298**
International filing date:		**26 October 2017 (26.10.2017)**
Document type:		**Certified copy of priority document**
Document details:	Country/Office:	**US**
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Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a),(b) or (b-*bis*)

34, chemin des Colombettes
1211 Geneva 20, Switzerland
www.wipo.int

Information on Search Strategy - Pilot phase (see OJ 2015, A86)
The type of information contained in this sheet may change during the pilot for improving the usefulness of this new service.

Application Number
PCT/IB2017/001298

TITLE: IMPLEMENT CONTOURING TOOLBAR

APPLICANT: AGCO CORPORATION

IPC CLASSIFICATION: A01B63/114, A01B63/32

EXAMINER: Van Woensel, Gerry

CONSULTED DATABASES: WPI

CLASSIFICATION SYMBOLS DEFINING EXTENT OF THE SEARCH:

IPC:

CPC: A01B63/114, A01B63/32, A01C7/203

FI/F-TERMS:

KEYWORDS OR OTHER ELEMENTS FEATURING THE INVENTION:
A system, comprising:a frame member;a toolbar coupled to the frame member, the toolbar parallel to, and rearward of, the frame member;a row unit coupled to the toolbar; andan actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar based on a sensed position of the toolbar.

EPO FORM P04A42

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/IB2017/001298	26.10.2017	16.12.2016

International Patent Classification (IPC) or both national classification and IPC
INV. A01B63/114 A01B63/32

Applicant
AGCO CORPORATION

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 43*bis*.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 usually 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 notifed the International Bureau under Rule 66.1*bis*(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:	Date of completion of this opinion	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465	see form PCT/ISA/210	Van Woensel, Gerry Telephone No. +49 89 2399-0

Form PCT/ISA/237 (Cover Sheet) (January 2015)

Box No. I Basis of the 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(a))

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:

      ☐ in the form of an Annex C/ST.25 text file.

      ☐ on paper or in the form of an image file.

   b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

   c. ☐ furnished subsequent to the international filing date for the purposes of international search only:

      ☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).

      ☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

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

1. Statement

Novelty (N)	Yes:	Claims	
	No:	Claims	1-20
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-20
Industrial applicability (IA)	Yes:	Claims	1-20
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

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1 **Re Item V**

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1.1 Reference is made to the following documents:

D1	WO 2014/066654 A1 (PREC PLANTING LLC [US]) 1 May 2014 (2014-05-01)
D2	US 2015/230391 A1 (HOUCK SHANE [US]) 20 August 2015 (2015-08-20)
D3	US 6 112 827 A (REIBER PHILLIP A [CA] ET AL) 5 September 2000 (2000-09-05)
D4	EP 2 524 587 A1 (DEERE & CO [US]) 21 November 2012 (2012-11-21)

1.2 The present application does not meet the criteria of Article 33(2) PCT, because the subject-matter of claim 1 is not new.

Each of D1-D4 discloses (see the passages and figures cited in the International Search Report for the respective documents)

1.3 a system, comprising:
a frame member;
a toolbar coupled to the frame member, the toolbar parallel to, and rearward of, the frame member;
a row unit coupled to the toolbar; and
an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar based on a sensed position of the toolbar.

1.4 The same objection is valid for the subject-matter of corresponding independent claims 19 and 20.

1.5 Dependent claims 2-18 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step, see D1-D4.

2 **Re Item VII**

Certain defects in the international application

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2.1 Independent claim 1 is not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art D1 being placed in the preamble (Rule 6.3(b)(i) PCT) and the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

2.2 The features of claims 1-20 are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

2.3 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in D1-D4 is not mentioned in the description, nor are these documents identified therein.

3 **Re Item VIII**

Certain observations on the international application

3.1 The application does not meet the requirements of Article 6 PCT, because claims 1-20 are not clear.

3.2 Claim 1 does not meet the requirements of Article 6 PCT in that the matter for which protection is sought is not clearly defined. The functional statement ["*configured to rotate the toolbar based on a sensed position of the toolbar*"] does not enable the skilled person to determine which technical features are necessary to perform the stated function.

3.3 It is clear from the application that the missing technical features are essential to the definition of the invention.

Since independent claim 1 does not contain these features it does not meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT that any independent claim must contain all the technical features essential to the definition of the invention.

3.4 Although claims 1 and 19 have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought or in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Article 6 PCT.

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(71) Applicant: **AGCO CORPORATION** [US/US]; 4205 River Green Parkway, Duluth Georgia (US).

(72) Inventors: **FANSHIER, Benjamin, Anson**; c/o Agco Corporation, 420 W. Lincoln Boulevard, Hesston, KS 67062-0969 (US). **SCHERTZ, Rex**; c/o Agco Corporation, 420 W. Lincoln Boulevard, Hesston, KS 67062-0969 (US).

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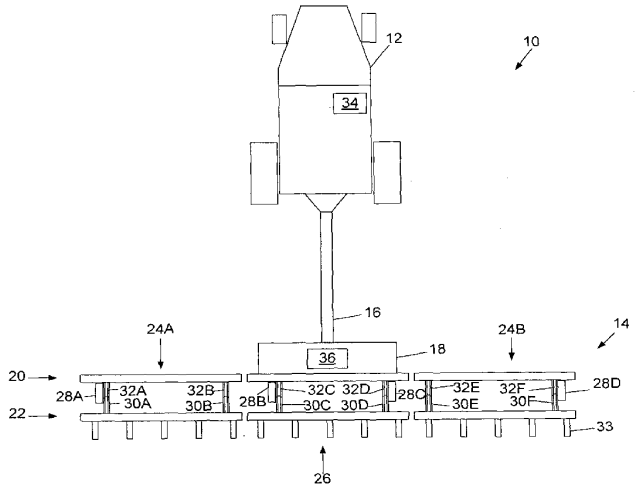


FIG. 1

(57) Abstract: In one embodiment, a frame member; a toolbar coupled to the frame member, the toolbar parallel to, and rearward of, the frame member; a row unit coupled to the toolbar; and an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar based on a sensed position of the toolbar.

IMPLEMENT CONTOURING TOOLBAR

TECHNICAL FIELD

[0001] The present disclosure is generally related to implements, and, more particularly, agricultural implements.

BACKGROUND

[0002] Implements, such as agricultural implements, are used to enable the engagement of tool attachments, including row units, with the soil for seeding, fertilizing, soil agitation, etc. As implements continue to get wider, they tend to have longer, rigid sections that do not handle uneven fields well. For instance, the field may comprise gullies and/or terraces that compromise the ability of the row units to properly operate in the field. As an example, when a planter encounters a terrace, frame wheels of the implement lift the row units up and out of the ground. Conversely, as the wheels go down the back of the terrace, the entire weight of the frame rests on the row units. In either case, possible detrimental results include insufficient crop yield due to seeds being planted too shallow or too deep.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] Many aspects of a contouring toolbar system of the present disclosure can be better understood with reference to the following drawings. The components in the drawings are not necessarily to scale, emphasis instead being placed upon clearly illustrating the principles of a contouring toolbar system. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the several views.

[0004] FIG. 1 is a schematic diagram that illustrates an example environment in which an embodiment of an example contouring toolbar system may be used.

[0005] FIG. 2 is a schematic diagram that illustrates, in side elevation view, an embodiment of an example contouring toolbar system with the toolbar in a flat or zero angle position.

[0006] FIG. 3 is a schematic diagram that illustrates, in fragmentary, side elevation view, an embodiment of an example contouring toolbar system with an implement comprising a toolbar in various angular positions.

[0007] FIGS. 4A-4B are schematic diagrams that illustrate, in fragmentary side elevation view, example field contours that trigger activation of the actuators of an embodiment of an example contouring toolbar system.

[0008] FIG. 5A is a block diagram that illustrates an example control system for an embodiment of an example contouring toolbar system.

[0009] FIG. 5B is a block diagram that illustrates an example controller for the control system of FIG. 5A.

[0010] FIG. 6 is a flow diagram that illustrates an embodiment of an example contouring toolbar method.

DESCRIPTION OF EXAMPLE EMBODIMENTS

Overview

[0011] In one embodiment, a frame member; a toolbar coupled to the frame member, the toolbar parallel to, and rearward of, the frame member; a row unit coupled to the toolbar; and an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar based on a sensed position of the toolbar.

Detailed Description

[0012] Certain embodiments of a contouring toolbar system and method are disclosed that enable an implement with row units to navigate across uneven fields while controlling a relationship of a row unit toolbar to the ground independently of the implement, frame-mounted wheels. In one embodiment, a contouring toolbar system comprises an actuator coupled between a frame member and a toolbar, the actuator retracted or extended based on the position of the toolbar as sensed by one or more sensors, which in turn maintains the coupled row units properly engaged with (e.g., seeding) the soil despite the contoured surfaces of the field. In some embodiments, the contouring toolbar system uses the sensed position of the toolbar to enable in-field planting operations, including lifting and turning at the end of the field.

[0013] Digressing briefly, most implement designs (e.g., planters) comprise a row unit toolbar that remains rigid as the implement moves over contoured field surfaces. When the implement is towed over a terrace, for instance, the row unit may be lifted off of the ground due to the rigid structures involved, resulting in a shallow or surface-level seed depth. In other instances, such as when the row unit is approaching a valley or gulley where the towing vehicle is at a higher elevation, the row unit may receive the entire weight load of the frame, resulting in a seed depth that is excessive and possibly causing damage to the row unit. In contrast, certain embodiments of a contouring toolbar system actively control the rotation of the row unit toolbar, adapting the rotation to follow the contoured field surfaces and hence always attempting to keep the row units engaged with the ground (e.g., by attempting to control the toolbar to be at a level position relative to the ground, or stated otherwise, maintain a relatively consistent elevation of the toolbar relative to ground).

[0014] Having summarized various features of certain embodiments of a contouring toolbar system of the present disclosure, reference will now be made in detail to the

detailed description of a contouring toolbar system as illustrated in the drawings. While the disclosure is described in connection with these drawings, there is no intent to limit it to the embodiment or embodiments disclosed herein. Further, although the description identifies or describes specifics of one or more embodiments, such specifics are not necessarily part of every embodiment, nor are all various stated advantages associated with a single embodiment. On the contrary, the intent is to cover all alternatives, modifications and equivalents included within the spirit and scope of a contouring toolbar system as defined by the appended claims. Further, it should be appreciated in the context of the present disclosure that the claims are not necessarily limited to the particular embodiments set out in the description.

[0015] Note that references hereinafter made to certain directions, such as, for example, "front", "rear", "left" and "right", are made as viewed from the rear of the implement looking forwardly.

[0016] Attention is now directed to FIG. 1, which is a schematic diagram that illustrates an example environment 10 in which an embodiment of a contouring toolbar system may be used. It should be appreciated by one having ordinary skill in the art, in the context of the present disclosure, that the environment 10 depicted in FIG. 1 is merely illustrative of one example environment, and that in some embodiments, other environments may be used. The example environment 10 includes a towing vehicle 12, in this example a tractor, towing an implement 14. The tractor 12 and implement 14 are depicted in fragmentary view. In some embodiments, other types of towing vehicles, including a self-propelled vehicle with an integrated implement (in lieu of a towed implement) or towing vehicles of other axle arrangements or other chassis configurations may be used, and hence are contemplated to be within the scope of the disclosure. The tractor 12 is coupled to the implement 14 using any known hitch and/or

tongue assembly 16. The implement 14 may support equipment 18, which may include one or more product containers, control components, pumps, reservoirs, among other equipment used to dispense product and control functioning of the implement and/or its attachments. The implement 14 comprises a chassis that includes parallel frame members 20, 22 in fore and aft arrangement, respectively, when deployed (e.g., when the implement 14 is towed in the forward direction). In the depicted example, the implement 14 is extended in a transverse direction relative to the direction of field traversal. The implement 14 is segmented into wing sections 24 (e.g., 24A, 24B) and a center section 26 that supports the equipment 18 and trails directly behind the tractor 12. In some embodiments, the implement 14 may be towed in an orientation where the center section 26 is physically offset from the center of the tractor 12. Although not detailed in FIG. 1, the wing sections 24 are respectively coupled to the center section 26 in pivotal manner, enabling a folding in a plane occupied by the tractor 12 and implement 14 for narrow-profile transport. In some embodiments, the folding of the wings 24 may be achieved outside of the plane of the tractor 12 and implement 14 (e.g., folded upward above the plane and rearward). Coupled to the frame members 20 of the wing sections 24A, 24B and center section 26 are respective wheels 28 (e.g., 28A to frame member 20 of wing section 24A, 28B-28C to frame member 20 of center section 26, and 28D to frame member 20 of wing section 24B). Some embodiments of a contouring toolbar system may use additional wheels (e.g., in tandem, as duals, or otherwise) in the same or different positions, or arrange the wheels in different locations than shown. For instance, in some embodiments, the wheels 28 may not be disposed between the frame members 20, 22. However, in the depicted example, the wheels 28 are disposed between the frame members 20, 22. Each frame member 20, 22 comprises bracket arms 42 (not designated in FIG. 1, but shown in FIG. 2) and 30 (e.g.,

30A-30F), respectively, that pivotably couple (e.g., via hinged joint to bracket arms of the frame member 20) the frame members 22 to the frame members 20.

[0017] Attached at the bracket arms 30A, 30B, 30E, 30F of the wing sections 24A, 24B are actuators 32 (e.g., 32A, 32B, 32E, and 32F), and attached to bracket arms 30C, 30D of the center section 26 are actuators 32 (e.g., 32C, 32D). Note that the location and/or quantity of bracket arms 30 and/or actuators 32 depicted in FIG. 1 is for illustration of one embodiment, and that in some embodiments, different and/or additional quantities and/or locations may be used. The actuators 32 may be configured as single rod hydraulic actuators (e.g., a linear-acting, piston and rod assembly, though in some embodiments, rotary actuation may be used). In some embodiments, the actuators 32 may be configured as either pneumatic, electric, magnetic, or electromagnetic actuators. The actuators 32 are configured to rotate the frame members 22 (e.g., the toolbar) of the wing and center sections 24, 26 to/from any position along a range of positions throughout an approximately one hundred ten (110) degree range, though in some embodiments, the range may be more or less. For instance, for field work and transport operations, the actuators 32 may rotate the frame members 22 relative to the frame members 20 to angular positions of zero (0) degrees (e.g., working a level or even surface of the field), approximately 20-40 degrees (e.g., raising the frame member 22 to clear a minimum recommended headlands elevation or a maximum recommended headlands rotation, respectively), and approximately 90 degrees (e.g., for narrow transport). Note that the angular position is construed relative to a horizontal plane of the frame members 20. The actuators 32 are also configured to rotate the frame members 22 of the wing and center sections 24, 26 to angular positions below the center or zero degree position. For instance, in one embodiment, the actuators 32 may be extended (e.g., the rods extended) to an angular position of

approximately 10 degrees below the zero degree reference (below level), such as to accommodate hills traversals, or even greater angles (as suggested by the 25 degree angle in FIG. 3, described below. In other words, the angular span of positions to which the frame member 22 may be rotated relative to the frame member 20 comprises an obtuse angle (e.g., over 90 degrees).

[0018] Removeably attached to the frame members 22 and arranged rearward to the frame members 22 are soil working tools 33, including row units that seed, fertilize, and/or agitate the soil. Though shown completely rearward of the frame members 22, in some embodiments, the row units 33 may be alternately staggered, with the row units 33 position completely rearward and slightly forward and rearward of the frame member 22. Other configurations may be used, as should be appreciated by one having ordinary skill in the art.

[0019] The tractor 12 also comprises a controller 34 that causes actuation of the actuators 32 based on operator input, software and/or device input, and/or sensor signals as explained further below. For instance, where the actuators 32 are configured as hydraulic cylinders, hydraulic fluid control may be achieved via a control component 36 that comprises one or more manifolds, each comprising one or more control valves that control a state of the hydraulic cylinders 32 (e.g., control the change in pressure and/or change in flow rate of hydraulic fluid through the cylinders). Actuation of the control component 36 may be achieved wirelessly or via wired connection (e.g., Isobus) according to commands from the controller 34.

[0020] Note that the contouring toolbar system may include the components described for the entire environment 10 in some embodiments, or a subset of the described components in some embodiments.

[0021] Having generally described an example environment 10 in which an embodiment of a contouring toolbar system may be used, attention is directed to FIG. 2, which illustrates an example implement 14 with a level or zero angle position of the frame member 22 relative to the frame member 20. In the depicted example, the wing sections 24 are folded forward relative to the center section 26. Only one row unit 33A is depicted as attached to the frame member 22, with the understanding that additional row units would typically be attached along the frame members 22. Referring to wing section 24A in particular with primary focus on the components associated with the actuator 32A, with the understanding that a similar description applies to the rotational components of the rest of the wing section 24A, the wing section 24B, and the center section 26 but omitted here for brevity, the frame member 22 comprises a toolbar 38. The toolbar 38 may be rectangular in shape, and comprises in one embodiment on the rearward side, tool brackets 40 that are uniformly spaced along the toolbar 38. The tool brackets 40 are secured to the toolbar 38 according to any known securement mechanism, including weld, bolts, etc. The tool brackets 40 facilitate attachment of respective soil working tools, such as row units 33A. On the opposing side of the toolbar 38 are the bracket arms 30, which extend forwardly from the toolbar 38. The bracket arms 30 couple via a hinged joint to rearward extending bracket arms 42 extending from the frame member 20.

[0022] Enabling rotation of the frame members 20, 22 are the plural actuators 32 (e.g., 32A). In one embodiment, the actuator 32A (as with the other actuators 32) is attached to an upper portion of the frame member 20 (e.g., at or proximal to the upper portion of the bracket arm 42) and the bracket arm 30 opposite the toolbar 38. Other locations may be used as long as the rotation of the toolbar 38 is achieved relative to the frame member 20. In FIG. 2, the actuators 32 have rotated the toolbar 38 to a zero (0) degree

angle relative to the horizontal plane of a transverse component of the frame member 20. In this orientation, row units 33A may be operational and engaged with the soil.

[0023] Referring now to FIG. 3, shown is an embodiment of an example contouring toolbar system with an implement 14A comprising a toolbar 38A in various angular positions. The implement 14A shown in FIG. 3 may be similarly structured and configured as implement 14 shown in FIGS. 1-2. The implement 14A is depicted diagrammatically with the frame member 20A comprising a bracket arm 42A, the bracket arm 42A pivotably coupled to the toolbar 38A (e.g., via a hinged connection at the bracket arm 30 (FIG. 2) and the bracket arm 42). The actuator 32A-1 provides for retracting and extending movements that cause the toolbar 38A to rotate relative to the frame member 20A. The toolbar 38A is coupled to the row unit 33B via a linkage 44. The linkage 44 is comprised of a parallelogram structure, as is known, and permits limited parallelogram motion between the toolbar 38A and the row unit 33B. The wheel 28A-1 is coupled to the frame member 20 in known manner, similar to that shown in FIG. 2, though as described above, some embodiments may use different chassis configurations and hence are contemplated to be within the scope of the disclosure. The implement 14A is shown resting on a field 46, the field 46 shown as a level surface and also angled to represent where the actuator 32A-1 needs to drop (extend) the toolbar 38A to follow the varying contours of the field surface. One of the points FIG. 3 is illustrating is that an embodiment of a contouring toolbar system is persistently attempting to control the "X" dimension to keep the row unit 33B engaged with the ground (e.g., to enable proper seeding, agitation, etc.). The "X" dimension is referenced relative to a location proximal to the row unit connection to the toolbar 38A (e.g., via the parallelogram linkage connection) relative to the ground, and hence corresponds to the toolbar position relative to the ground.

[0024] The toolbar 38A (38A in zero-angle position) is shown in multiple angular positions, including toolbar 38A-1, toolbar 38A-2, and toolbar 38A-3. At toolbar 38A-1, the actuator 32A-1 has raised (e.g., via full retraction of the corresponding rod) the toolbar 38A-1 to approximately 90 degrees (e.g., relative to a level surface or a longitudinal axis of the frame member 20A) for narrow transport.

[0025] At toolbar 38A-2, the actuator 32A-1 has raised the toolbar 38A-2 to approximately 10 degrees relative to a level surface or a longitudinal axis of the frame member 20A. Such actuation may occur, for instance, if the row unit 33B was traversing the backside of a terrace to attempt to control the X dimension relative to the ground surface to keep the row unit 33B engaged (which also may prevent excessive loads on the row unit 33B). Also, for field operations, an intermediate position of the toolbar 38A proximal to that depicted in FIG. 3 for toolbar 38A-2 may be sensed for permitting headland turning. For instance, the toolbar 38A may be raised to approximately 20-30 degrees, the rotation sensed to enable the controller 34 to stop at that operational position.

[0026] At toolbar 38A-3, the actuator 32A-1 has lowered the toolbar 38A-3 below zero degrees (e.g., approximately 10 degrees below the zero angular position). Such an actuation may occur if the row unit 33B was traveling on the upside of a hill as in the depicted example (the row unit 33B not actually shown traversing the slope of 25 degrees for ease of illustration). In other words, the actuation serves to attempt to maintain the X dimension of the toolbar 38A (e.g., and similarly, the row unit 33B), which in turn also avoids lifting the row unit 33B off of the surface of the field 46. As set forth above, additional actuation may be performed for even greater changes in traversed field contour (e.g., 25 degrees) in order to control the "X" dimension. As illustrated in FIG. 3, the toolbar position is adjusted to attempt to maintain a level operating position

relative to the contour of the surface and to enable proper engagement of the row unit 33B with the field 46.

[0027] In one embodiment, the control of the actuation is based on one or more sensors that sense the position of the toolbar 38A. The sensors may be disposed for each row unit 33B of a planter, or one or more sensors may be used for all of the row units 33B. In general, to enable the toolbar 38A (and hence toolbar 38A) to follow the contour of the field, sensor information is received about the (relative) position of the toolbar 38A (and by extension, the relative position of the row unit 33B) relative to the ground. A row unit sensor, such as sensor 50, is used for the contouring operation. In one embodiment, at least one row unit sensor 50 is used, though in some embodiments, there may be a row unit sensor 50 per every row unit 33B. Further, toolbar rotation for field operations may also rely on sensor information. For instance, at the end of a "pass", the row units 33B are lifted to a headland position, the towing vehicle turns around, and the row units 33B are lowered again to engage the field for the next pass. This operation is referred to as headland turning, which involves transitioning from a contouring or field operation position of the toolbar 38A (and hence row units 33B) to a pre-configured (or in some embodiments, operator-configured) intermediate angle of the toolbar 38A. Headland turning benefits from the use of sensor information about the toolbar position relative to the frame 20A. In one embodiment, one or more sensors, including sensor 48, may be used to provide this information. There may be a single sensor 48 corresponding to plural row units, or multiple sensors 48 (e.g., per row unit 33B). The sensor 48 may also be used for enabling transport, such as triggering an electronic stop (from signaling of the controller 34) when the toolbar 38A has reached the transport position (e.g., approximately 90 degrees).

[0028] The sensor 48 may be positioned proximal to the pivot point of the bracket arm 42 of the frame member 20 and where the toolbar 38A couples to the bracket arm 42. In this position, the sensor 48 senses the angular position and/or change in angular position between the toolbar 38A and the frame member 20. The sensor 50 may be located at the pivot point between the linkage 44 and the toolbar 38A, and used to sense the position of the toolbar 38A (and hence the position of the row unit 33B) relative to the ground. That is, the contouring toolbar system attempts to follow the contour of the field 46 (controlling the "X" dimension) as pivoting areas begin to move in response to the changes in field surfaces. In short, the contouring toolbar system attempts to keep the "X" dimension or the toolbar 38A relatively constant relative to the ground and also control the travel of the toolbar 38A in a manner that keeps the row unit 33B engaged with the ground.

[0029] In one embodiment, the sensors 48 and 50 may each be configured as a rotary encoder that provides an angle value for every programmed amount of sensed rotation. For instance, the rotary encoder may be optically-based, and for every detected rotation or click (e.g., assuming a single rotation or "click' per single degree, though other resolutions may be used), the controller 34 (FIG. 1) can track based on a signal from the sensors 48, 50 at what angle the toolbar 38A has rotated relative to the frame 20A (from sensor 48) and the ground (from sensor 50).

[0030] For contouring control, the controller 34 may be programmed to trigger actuation of the actuator 32A-1 based on a sensed (e.g., from sensor 50) defined threshold degree value away from a zero degree reference, providing a buffer to excessive actuations. In some embodiments, the rate of rotation may also trigger the controller 34 to communicate the speed of actuation. For instance, at a single click of the sensor 50, the controller 34 may communicate an actuation speed of a defined percentage (e.g.,

1%) or value, and a 5 degree rotation may trigger communication of a faster speed (e.g., 50%) to serve in an anticipatory manner to avoid wide or rapid stroke of the actuator 32A-1.

[0031] In some embodiments, the sensors 48 and/or 50 may be configured as non-contact type, electromagnetic sensors, including ultrasonic, radar, or lidar type sensors, or as a combination of angular position and non-contact types. For instance, the electromagnetic sensors may detect the position of the ground (e.g., via transmittal to and reflection from the ground) relative to the toolbar 38A and communicate a signal to the controller 34 to cause adjustment of the toolbar 38A to control (e.g., maintain) the toolbar-to-ground dimension X substantially constant. Note that in some embodiments, the electromagnetic sensors may be located in other locations, including at the row unit 33B. the electromagnetic sensors may be configured to detect an absolute elevation of the toolbar 38A relative to ground or a change in elevation relative to ground.

[0032] Attention is now directed to FIGS. 4A-4B, which illustrate, diagrammatically, example operations of an embodiment of a contouring toolbar system. Shown is a tractor 52 coupled to a planter frame 54. The planter frame 54 is pivotably coupled to a toolbar 56 via bracket arms 58, 60. Coupled between bracket arms 58, 60 is actuator 62. The toolbar 56 is further coupled to the row unit 64 via linkage 66. Note that the planter frame 54 may be similar to the frame member 20 (FIG. 1), and the bracket arms 58, 60 may be similar to bracket arms 42 and 30 (FIGS. 1-2). Also, the toolbar 56 may be similar to toolbar 38 (FIG. 3), and the row unit 64 and linkage 66 may be similar to the row unit 33 (FIGS. 1-2) and linkage 44 (FIG. 3), respectively. Referring to FIG. 4A, the planter frame 54 is shown commencing a downward slope of a hill 68. An angle sensor 70 positioned proximal to the toolbar 56 and row unit 64 and senses a change in position of the toolbar 56 (and hence row unit 64) relative to the ground and signals to

the controller 34. The controller 34, in turn, processes the received signal and signals to a control component 72 to change a state of the actuator 62 (e.g., change in pressure and/or fluid flow in the case of a hydraulic actuator) according to the determined angular change, resulting in the rod of the actuator 62 extending to rotate the toolbar 56 downward to adjust to the change in contour. Note that in conventional systems, the row unit may be lifted off of the ground due to the rigid structures involved, resulting in insufficient planting depth.

[0033] Referring to FIG. 4B, the planter frame 54 is traversing up a slope while the row unit 64 is heading down to a valley 69 or gulley. The sensor 70 senses the change in angular position of the toolbar 56 (and row unit 64) relative to the ground and signals to the controller 34. The controller 34 in turn signals to the control component 72 according to the determined angular change, resulting in the rod of the actuator 62 being retracted to cause the toolbar 56 to rotate up to adjust to the change in contour. In a conventional system, the row unit may lose engagement with the field, resulting in the deposit of seed at too much depth, affecting yield negatively. Also, the row unit in a conventional system may be exposed to excessive forces (e.g., possibly causing the row unit to damage or break off).

[0034] Reference is now made to FIG. 5A, which illustrates an embodiment of an example control system 74 used for controlling operations of the toolbar rotations for an embodiment of a contouring toolbar system. It should be appreciated within the context of the present disclosure that some embodiments may include additional components or fewer or different components, and that the example depicted in FIG. 5A is merely illustrative of one embodiment among others. The control system 74 may be located entirely on the implement (e.g., implement 14, FIG. 1), distributed among the towing vehicle (e.g., tractor 12, FIG. 1) and the implement, or among additional devices (e.g.,

remote control). Further, though depicted using a single controller 34, in some embodiments, the control system 74 may be comprised of plural controllers similarly configured to controller 34. In the depicted embodiment, the controller 34 is coupled via one or more networks, such as network 76 (e.g., a CAN network or other network, such as a network in conformance to the ISO 11783 standard, also referred to as "Isobus"), to control components 78, one or more sensors 80, a user interface 82, a communications interface (COMM INT) 84, and a global navigation satellite systems (GNSS) receiver 86. The control components 78 may be configured similarly to control components 36 (FIG. 1) and 72 (FIG. 4A). The sensors 80 may be configured similarly to sensors 48, 50 (FIG. 3), and/or 70 (FIG. 4A). Note that control system operations are primarily disclosed herein in the context of control via the single controller 34, with the understanding that additional controllers may be involved in one or more of the disclosed functionality in some embodiments.

[0035] The control components 78 may comprise a manifold comprising one or more or a combination thereof of control valves, air valves, switches, relays, solenoids, motors, etc., to cause actuation of the actuators (e.g., actuator 32, FIG. 2) that control the rotation of the toolbars (e.g., toolbar 38, FIG. 2). In the depicted example, the control components 78 comprises one or more multi-position (e.g., 3-position) hydraulic control valves with coupled solenoids, the solenoids receiving signaling from the controller 34 and causing movement of a spool or poppet(s) of the control valves. The control valves in turn regulate the flow into and out of actuators that, in one embodiment, comprise linear acting, rod and single piston-type hydraulic cylinders 88. The regulation of the flow and/or pressure across the piston enables the retraction or extension of the rod as needed. As suggested above, the control technology may be comprised of pneumatic, electric, magnetic, or electromagnetic.

[0036] The sensors 80 may be comprised of angle positioning sensors (e.g., rotary encoders, including optical based or other electromagnetic frequencies), or non-contact type sensors, including radar, acoustic, lidar, among others. In some embodiments, a combination of these types of sensors may be used. The sensors 80 are used to determine the position of the row unit toolbar, including via the determination of the distance between the toolbar and the ground surface and/or the angular position of the toolbar relative to the frame member (e.g., frame member 20, FIG. 1).

[0037] The user interface 82 may include one or more components, including one or any combination of a keyboard, mouse, microphone, touch-type or non-touch-type display device (e.g., display monitor or screen), joystick, steering wheel, FNR lever, and/or other devices (e.g., switches, immersive head set, etc.) that enable input and/or output by an operator. For instance, in some embodiments, the user interface 82 may be used to present on a display screen implement control options (e.g., drop the toolbar for engagement of the row units with the soil, raise the toolbar for headlands, raise the toolbar for transport, etc.) for the operator to choose from, and/or the user interface 82 may provide feedback of when these actions are taken or about to be taken when performed automatically (e.g., providing an operator the opportunity to reject or acknowledge or merely observe). In some embodiments, the feedback may be in the form of recommendations to the operator for taking certain actions. In one embodiment, a visual of the implement may be presented on the screen, with the sensor data communicated in the form of data and/or a visual of the movement of the toolbar relative to the field contour. In some embodiments, the functions of manually rotating the toolbar to various operational positions may be performed via actuation of a switch, lever, handle, etc., or verbally commanded.

[0038] The communications interface 84 may comprise a wireless network interface module (e.g., including an RF and/or cellular modem) for wireless communication among other devices of the towing vehicle/implement combination or with remote devices (e.g., external from the implement and towing vehicle). The communications interface 84 may work in conjunction with communication software (e.g., including browser software) in the controller 34, or as part of another controller coupled to the network 76 and dedicated as a gateway for wireless communications with other devices or networks. The communications interface 84 may comprise MAC and PHY components (e.g., radio circuitry, including transceivers, antennas, etc.), as should be appreciated by one having ordinary skill in the art.

[0039] The GNSS receiver (GNSS RX) 86 may be comprised of a GPS receiver, for instance, to receive location coordinates of the towing vehicle and/or implement. The GNSS receiver 86 may function in cooperation with field maps stored locally in the controller 34 (or accessed from a remote server) to enable detection of headlands, roads, field entrances, and/or locations for surface features (e.g., hills, gullies), etc. For instance, the use of locations of surface features may be used in part to enable the controller 34 to improve anticipation of the extent (e.g., speed) of actuation for rotating the toolbar.

[0040] FIG. 5B further illustrates an example embodiment of the controller 34. One having ordinary skill in the art should appreciate in the context of the present disclosure that the example controller 34 is merely illustrative, and that some embodiments of controllers may comprise fewer or additional components, and/or some of the functionality associated with the various components depicted in FIG. 5B may be combined, or further distributed among additional modules, in some embodiments. It should be appreciated that, though described in the context of residing in a towing

vehicle (e.g., the tractor 52 (FIG. 4A), in some embodiments, the controller 34, or all or a portion of its corresponding functionality, may be implemented at the implement (e.g., implement 14, FIG. 1) or in a computing device or system located external to the tractor and/or implement. Referring to FIG. 5B, with continued reference to FIG. 5A, the controller 34 or electronic control unit (ECU) is depicted in this example as a computer, but may be embodied as a programmable logic controller (PLC), field programmable gate array (FPGA), application specific integrated circuit (ASIC), among other devices. It should be appreciated that certain well-known components of computers are omitted here to avoid obfuscating relevant features of the controller 34. In one embodiment, the controller 34 comprises one or more processors (also referred to herein as processor units or processing units), such as processor 90, input/output (I/O) interface(s) 92, and memory 94, all coupled to one or more data busses, such as data bus 96. The memory 94 may include any one or a combination of volatile memory elements (random-access memory RAM, such as DRAM, and SRAM, etc.) and nonvolatile memory elements (e.g., ROM, Flash, hard drive, EPROM, EEPROM, CDROM, etc.). The memory 94 may store a native operating system, one or more native applications, emulation systems, or emulated applications for any of a variety of operating systems and/or emulated hardware platforms, emulated operating systems, etc.

[0041] In the embodiment depicted in FIG. 5B, the memory 94 comprises an operating system 98 and contouring toolbar control software (SW) 100. It should be appreciated that in some embodiments, additional or fewer software modules (e.g., combined functionality) may be deployed in the memory 94 or additional memory. For instance, the memory 94 may also include browser software and/or communications software. In some embodiments, a separate storage device may be coupled to the data bus 96, such

as a persistent memory (e.g., optical, magnetic, and/or semiconductor memory and associated drives).

[0042] The contouring toolbar control software (SW) 100 receives input from the user interface 82 (via the I/O interfaces 92 and network 76) and sensor input from the sensors 80 (via the I/O interfaces 92 and network 76). In some embodiments, the contouring toolbar control software (SW) 100 may receive additional input, including location coordinates from the GNSS receiver, such as to identify certain surface features, headlands, and/or roads to trigger certain toolbar rotations. As suggested above, the sensor input is converted to an actuation signal (including a magnitude and optionally a rate), which is used to cause a suitable stroke to meet the required compensatory motion by the actuator (e.g., cylinders 88) to adjust the toolbar rotation. In some embodiments, operator input at the user interface 82 is also communicated and translated to an actuation signal to maneuver the toolbar to an appropriate position (e.g., to raise the toolbar at a headland, for narrow transport, etc.). The contouring toolbar control software (SW) 100 also provides user interface functionality to provide feedback of certain toolbar rotations, with or without the ability for the operator to intervene as explained previously.

[0043] Execution of the contouring toolbar control software (SW) 100 may be implemented by the processor 90 under the management and/or control of the operating system 98. The processor 90 may be embodied as a custom-made or commercially available processor, a central processing unit (CPU) or an auxiliary processor among several processors, a semiconductor based microprocessor (in the form of a microchip), a macroprocessor, one or more application specific integrated circuits (ASICs), a plurality of suitably configured digital logic gates, and/or other well-known electrical

configurations comprising discrete elements both individually and in various combinations to coordinate the overall operation of the controller 34.

[0044] The I/O interfaces 92 provide one or more interfaces to the network 76 and other networks. In other words, the I/O interfaces 92 may comprise any number of interfaces for the input and output of signals (e.g., analog or digital data) for conveyance of information (e.g., data) over the network 76. The input may comprise input by an operator (local or remote) through the user interfaces 82 and input from signals carrying information from one or more of the components of the control system 74, as explained above.

[0045] When certain embodiments of the controller 34 are implemented at least in part with software (including firmware), as depicted in FIG. 5B, it should be noted that the software can be stored on a variety of non-transitory computer-readable medium for use by, or in connection with, a variety of computer-related systems or methods. In the context of this document, a computer-readable medium may comprise an electronic, magnetic, optical, or other physical device or apparatus that may contain or store a computer program (e.g., executable code or instructions) for use by or in connection with a computer-related system or method. The software may be embedded in a variety of computer-readable mediums for use by, or in connection with, an instruction execution system, apparatus, or device, such as a computer-based system, processor-containing system, or other system that can fetch the instructions from the instruction execution system, apparatus, or device and execute the instructions.

[0046] When certain embodiment of the controller 34 are implemented at least in part with hardware, such functionality may be implemented with any or a combination of the following technologies, which are all well-known in the art: a discrete logic circuit(s) having logic gates for implementing logic functions upon data signals, an application

specific integrated circuit (ASIC) having appropriate combinational logic gates, a programmable gate array(s) (PGA), a field programmable gate array (FPGA), etc.

[0047] Having described some example embodiments of a contouring toolbar system, it should be appreciated in view of the present disclosure that one embodiment of a computer-implemented method for an implement that comprises a toolbar that has row units secured thereto, the method for adjusting a rotation of the toolbar based on a contour of a field on which the implement traverses, the method denoted as method 102 and illustrated in FIG. 6, comprises, at a controller (e.g., controller 34, FIG. 5B): receiving an indication of a first angle change of the toolbar relative to ground (104); causing an actuator that pivotably couples the toolbar to the frame member to retract based on the indication of the first angle change (106); receiving an indication of a second angle change of the toolbar relative to the ground (108); and causing the actuator to extend based on the indication of the second angle change (110).

[0048] Any process descriptions or blocks in flow diagrams should be understood as representing modules, segments, or portions of code which include one or more executable instructions for implementing specific logical functions or steps in the process, and alternate implementations are included within the scope of the embodiments in which functions may be executed out of order from that shown or discussed, including substantially concurrently or in reverse order, depending on the functionality involved, as would be understood by those reasonably skilled in the art of the present disclosure.

[0049] It should be emphasized that the above-described embodiments of a contouring toolbar system are merely possible examples of implementations, merely set forth for a clear understanding of the principles of the contouring toolbar system. Many variations and modifications may be made to the above-described embodiment(s) of the

contouring toolbar system without departing substantially from the spirit and principles of the disclosure. All such modifications and variations are intended to be included herein within the scope of the disclosure and protected by the following claims.

CLAIMS

At least the following is claimed:

1. A system, comprising:

a frame member;

a toolbar coupled to the frame member, the toolbar parallel to, and rearward of, the frame member;

a row unit coupled to the toolbar; and

an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar based on a sensed position of the toolbar.

2. The system of claim 1, further comprising a first sensor coupled to the toolbar, the first sensor configured to sense a position of the toolbar relative to ground, the position of the toolbar corresponding to a position of the row unit relative to the ground.

3. The system of claim 2, further comprising a second sensor coupled to the frame member, the second sensor configured to sense an angle of the toolbar relative to the frame member.

4. The system of claim 3, further comprising a controller, the controller configured to receive first and second signals from the first and second sensors and cause actuation of the actuator based on the first and second signals.

5. The system of claim 4, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

6. The system of claim 5, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

7. The system of claim 4, wherein the controller is further configured to cause adjustment of a rate of rotation based on the first signals from the first sensor.

8. The system of claim 2, further comprising a controller, the controller configured to receive a signal from the first sensor and cause actuation of the actuator based on the signal.

9. The system of claim 8, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

10. The system of claim 9, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

11. The system of claim 8, wherein the controller is further configured to cause adjustment of a rate of rotation based on the signal from the first sensor.

12. The system of claim 1, wherein the sensed position is relative to a field surface, further comprising one or more electromagnetic sensors coupled to the frame member, the toolbar, or a combination of the frame member and the toolbar, the one or more electromagnetic sensors configured to sense an absolute elevation or change in elevation between the field surface and the toolbar or a combination of both the frame member and the toolbar.

13. The system of claim 12, further comprising a controller, the controller configured to receive one or more signals from the one or more electromagnetic sensors and cause actuation of the actuator based on the one or more signals.

14. The system of claim 13, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

15. The system of claim 14, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

16. The system of claim 13, wherein the controller is further configured to cause adjustment of a rate of rotation based on the one or more signals from the one or more electromagnetic sensors.

17. The system of claim 12, wherein the one or more electromagnetic sensors comprise ultrasonic, lidar, or radar sensors.

18. The system of claim 1, wherein the actuator is configured to rotate the toolbar throughout an obtuse angle range.

19. A control system for an implement comprising a frame member and a toolbar rearward of and parallel to the frame member, wherein secured to the toolbar are plural row units, the control system comprising:

a controller;

one or more sensors configured to sense a position of the toolbar; and

an actuator coupled between the frame member and the toolbar, wherein the controller is configured to receive a signal or signals from the one or more sensors indicating the position and cause the actuator to rotate the toolbar based on the sensed position of the toolbar.

20. A computer-implemented method for an implement that comprises a toolbar that has row units secured thereto, the method for adjusting a rotation of the toolbar based on a contour of a field on which the implement traverses, the method comprising:

at a controller:

receiving an indication of a first angle change of the toolbar relative to ground;

causing an actuator that pivotably couples the toolbar to the frame member to retract based on the indication of the first angle change;

receiving an indication of a second angle change of the toolbar relative to the ground; and

causing the actuator to extend based on the indication of the second angle change.

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
AGCO - Exhibit No. 2005
IPR2024-001459
Page 260

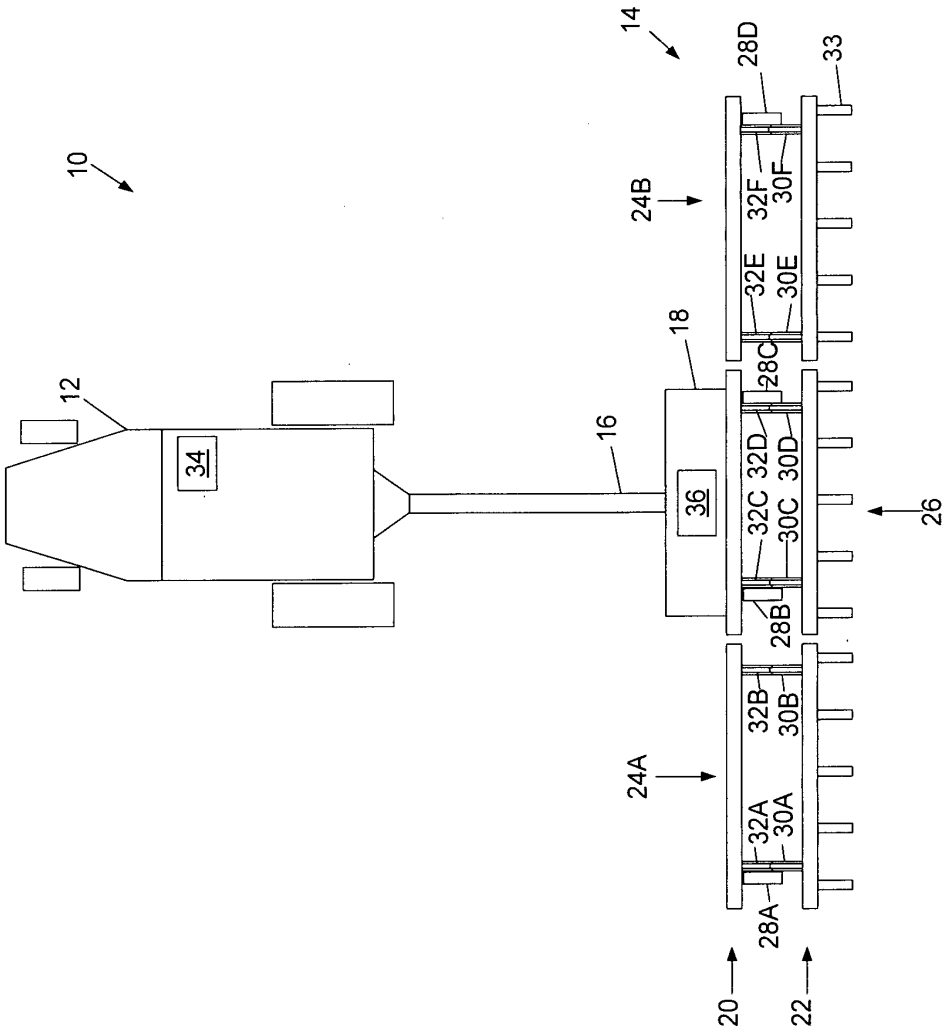

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24B
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FIG. 1

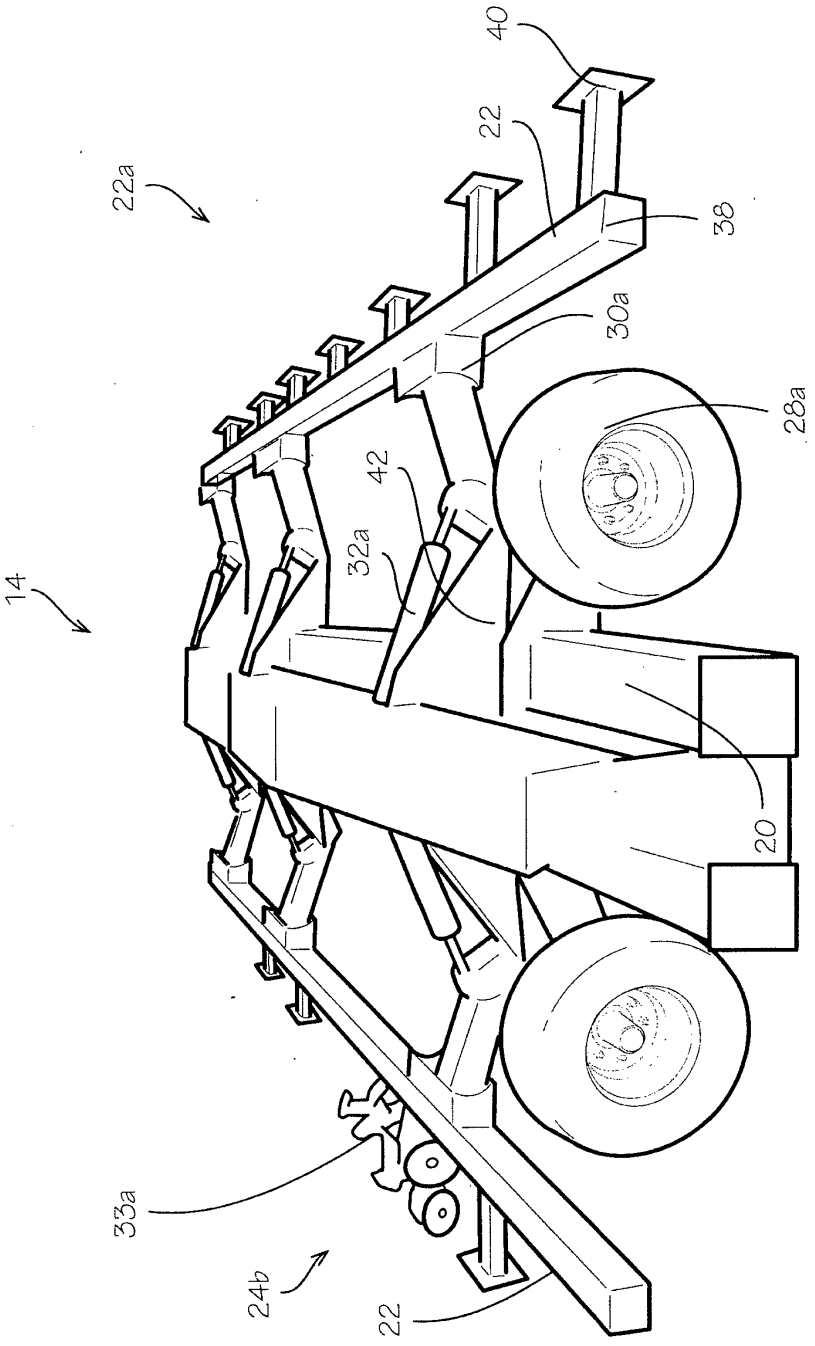


FIG. 2

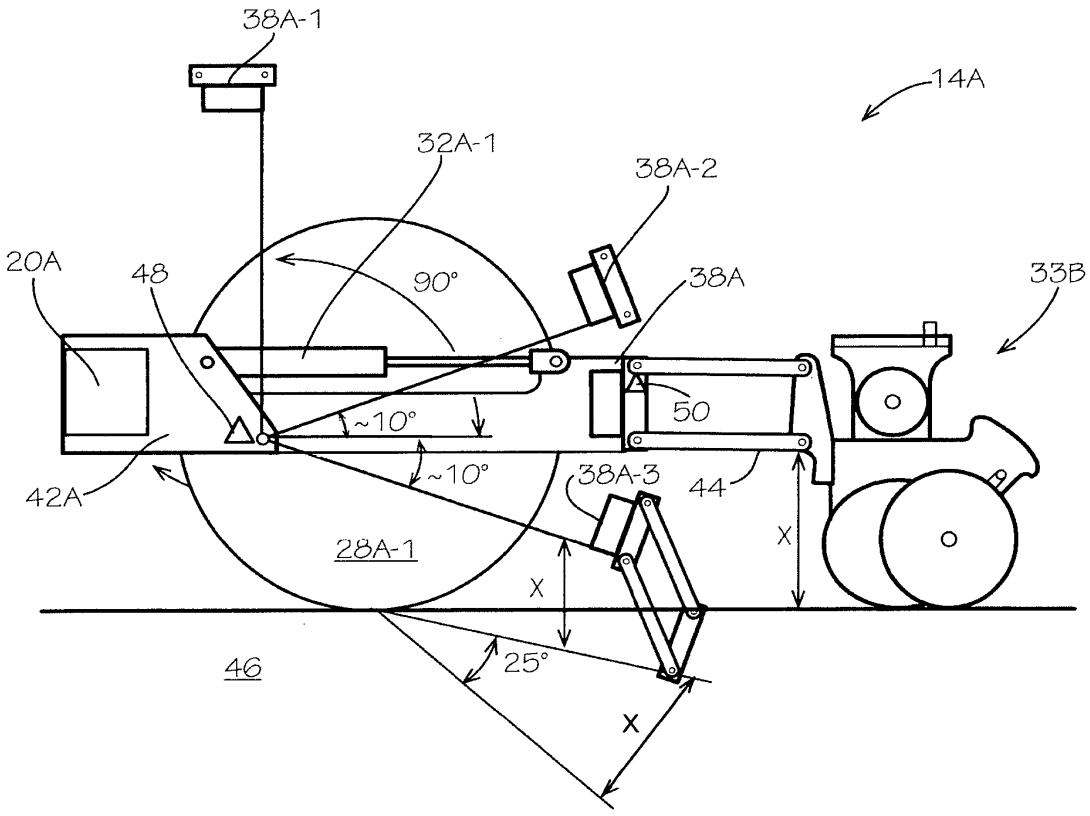

38A-1
14A
32A-1
38A-2
20A
48
90°
38A
33B
50
~10°
~10°
38A-3
44
42A
28A-1
X
X
46
25°
X

FIG. 3

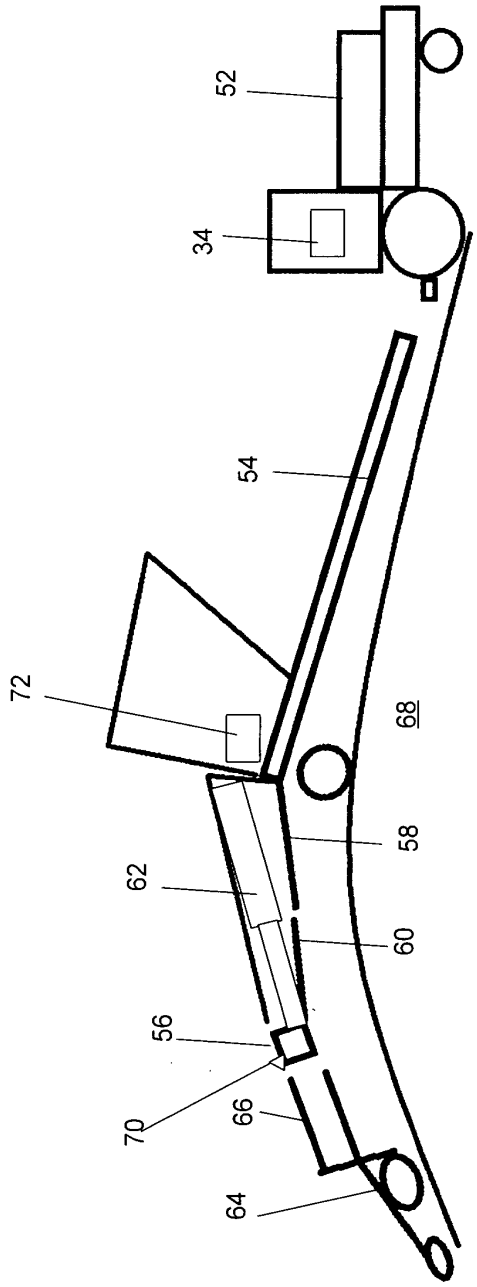


FIG. 4A

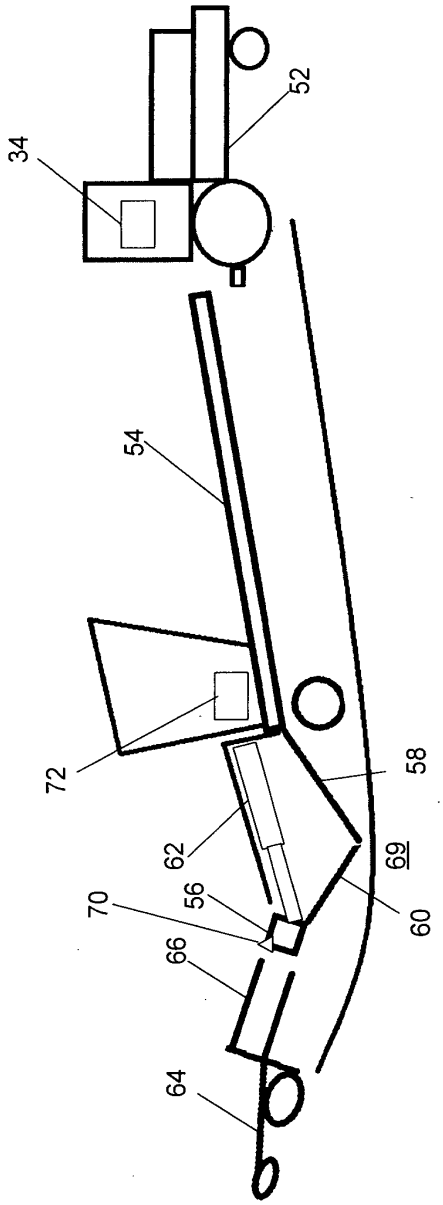


FIG. 4B

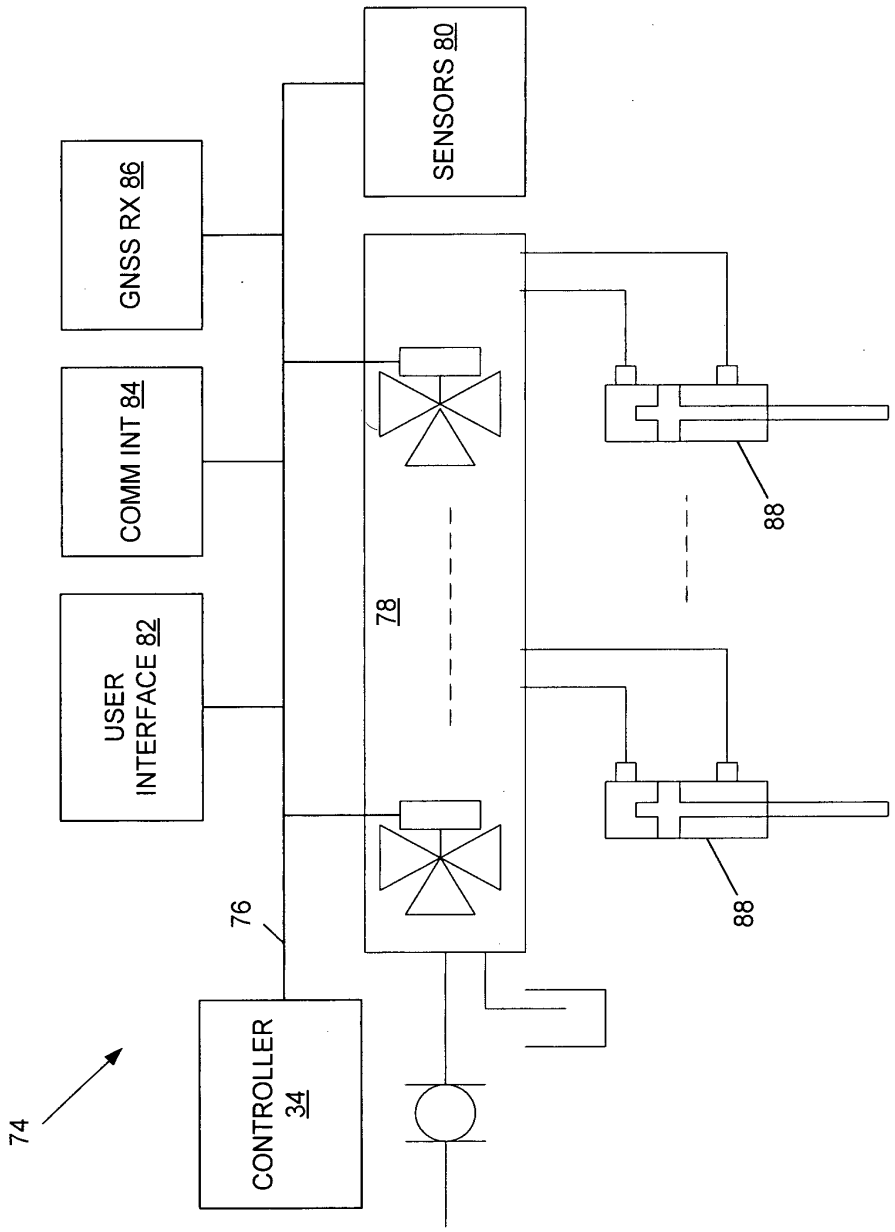

SENSORS 80
GNSS RX 86
COMM INT 84
USER INTERFACE 82
78
88
88
76
CONTROLLER 34
74

FIG. 5A

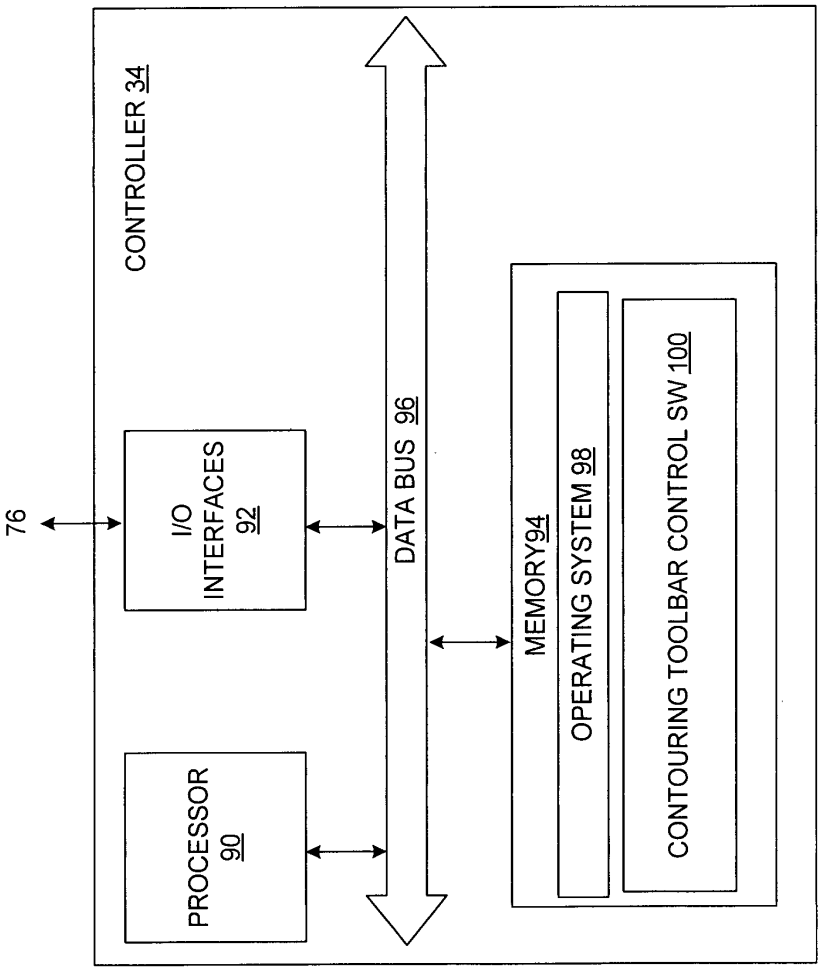

CONTROLLER 34
76
I/O INTERFACES 92
DATA BUS 96
PROCESSOR 90
MEMORY 94
OPERATING SYSTEM 98
CONTOURING TOOLBAR CONTROL SW 100

FIG. 5B

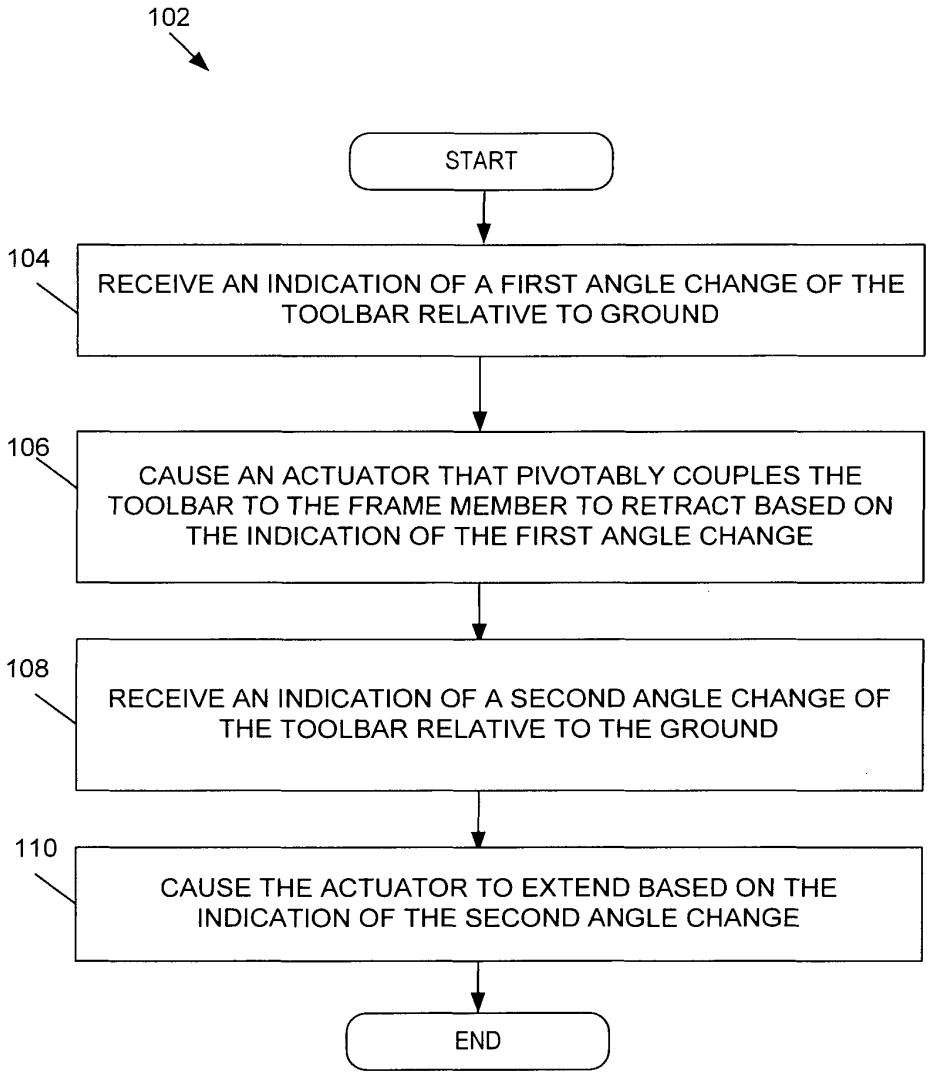

102
START
104
RECEIVE AN INDICATION OF A FIRST ANGLE CHANGE OF THE TOOLBAR RELATIVE TO GROUND
106
CAUSE AN ACTUATOR THAT PIVOTABLY COUPLES THE TOOLBAR TO THE FRAME MEMBER TO RETRACT BASED ON THE INDICATION OF THE FIRST ANGLE CHANGE
108
RECEIVE AN INDICATION OF A SECOND ANGLE CHANGE OF THE TOOLBAR RELATIVE TO THE GROUND
110
CAUSE THE ACTUATOR TO EXTEND BASED ON THE INDICATION OF THE SECOND ANGLE CHANGE
END

FIG. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2017/001298

A. CLASSIFICATION OF SUBJECT MATTER
INV. A01B63/114 A01B63/32
ADD.

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)
A01B A01C

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2014/066654 A1 (PREC PLANTING LLC [US]) 1 May 2014 (2014-05-01) paragraph [0020] - paragraph [0036] figure 1	1-20
X	US 2015/230391 A1 (HOUCK SHANE [US]) 20 August 2015 (2015-08-20) paragraph [0040] - paragraph [0061]	1-20
X	US 6 112 827 A (REIBER PHILLIP A [CA] ET AL) 5 September 2000 (2000-09-05) figure 3 column 13, line 49 - column 15, line 40	1-20
X	EP 2 524 587 A1 (DEERE & CO [US]) 21 November 2012 (2012-11-21) the whole document	1-20

☐ 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

"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	Date of mailing of the international search report
5 January 2018	25/01/2018

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Van Woensel, Gerry

1

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2017/001298

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		AU 2017248423 A1	02-11-2017
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		US 2012291680 A1	22-11-2012

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PTO/AIA/80 (07-12)
Approved for use through 11/30/2014. OMB 0651-0035
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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

■ Practitioners associated with Customer Number: 88988

OR

☐ Practitioner(s) named below (If more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

[X] The address associated with Customer Number: 88988

OR

☐	Firm or Individual Name		
	Address		
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	Country		
	Telephone	Email	

Assignee Name and Address: AGCO Corporation
4205 River Green Parkway
Duluth, GA 30096

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record
The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	10/24/2013
Name	Roger Batkin	Telephone	
Title	VP, General Counsel and Corporate Secretary		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Doc Code: FAI.REQ
Document Description: Request First Action Interview

PTO/SB/413C (05-11)
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REQUEST FOR FIRST ACTION INTERVIEW (FULL PILOT PROGRAM)

Attorney Docket Number: US16/40/WO-US	Application Number (if known): 16/470,472	Filing date: June 17, 2019
First Named Inventor: Fanshier, Benjamin Anson	Title: Implement Contouring Toolbar	

APPLICANT HEREBY REQUESTS A FIRST ACTION INTERVIEW IN THE ABOVE-IDENTIFIED APPLICATION. See Instruction Sheet on page 2.

1. The application must contain three (3) or fewer independent claims and twenty (20) or fewer total claims.

2. The application must not contain any multiple dependent claims.

3. By filing this request:

   Applicant is agreeing to make an election without traverse if the Office determines that the claims are not obviously directed to a single invention; and

   Applicant is agreeing not to request for a refund of the search fee and any excess claims fee paid in the application after the mailing or notification of the pre-interview communication prepared by the examiner.

4. Other attachments: _____

Signature /Nathan E. Whitlock/	Date June 18, 2019
Name (Print/Typed) Nathan E. Whitlock	Registration Number 65,744

Note: *This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.*

☐ *Total of _____ forms are submitted.

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Instruction Sheet for Request for First Action Interview (Full Pilot Program)

(Not to be Submitted to the USPTO)

A grantable request must meet the following conditions:

1. The application must be a new non-reissue utility application filed under 35 U.S.C. 111(a) or an international application that has entered the national stage in compliance with 35 U.S.C. 371(c).

2. The application must contain three (3) or fewer independent claims and twenty (20) or fewer total claims. The application may not contain any multiple dependent claims.

3. The request must be filed electronically using the Office's electronic filing system, EFS-Web.

4. The claims must be directed to a single invention. If the Office determines that the claims are directed to multiple inventions (*e.g.*, in a restriction requirement), the applicant must make an election without traverse.

5. The request must be filed at least one day before a first Office action on the merits of the application appears in the Patent Application Information Retrieval (PAIR) system (*i.e.*, at least one day prior to the date when a first Office action on the merits, notice of allowability or allowance, or action under Ex parte Quayle, 1935 Dec. Comm'r Pat. 11 (1935) appears in the PAIR system). Applicant may check the status of the application using the PAIR system.

6. The request for a first action interview must include a statement that applicant agrees not to file a request for a refund of the search fee and any excess claims fees paid in the application after the mailing or notification of the Pre-Interview Communication. Any petition for express abandonment under 37 CFR 1.138(d), and request for a refund of the search fee and any excess claims fees, filed after the mailing or notification of the Pre-Interview Communication will not be granted.

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AGCO - Exhibit No. 2005
IPR2024-001459
Page 273

Electronic Acknowledgement Receipt

EFS ID:	36334508
Application Number:	16470472
International Application Number:	
Confirmation Number:	1653
Title of Invention:	IMPLEMENT CONTOURING TOOLBAR
First Named Inventor/Applicant Name:	Benjamin Anson Fanshier
Customer Number:	88988
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	POA_US_Roger.pdf	86720 08319beaaba4a2d3b9f158ad66acf34a5fcbfbfb	no	1
Warnings:					

Information:					
2	First Action Interview - Schedule Interview request	US1640WOUS-2_FirstActionInterviewRequest.pdf	621221 f5a2401979b6052757e0952949375d78519 6fa2d	no	3
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505529076 06/17/2019

PATENT ASSIGNMENT COVER SHEET

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NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
BENJAMIN ANSON FANSHIER	12/16/2016
REX SCHERTZ	12/16/2016

RECEIVING PARTY DATA

Name:	AGCO CORPORATION
Street Address:	4205 RIVER GREEN PARKWAY
City:	DULUTH
State/Country:	GEORGIA
Postal Code:	30096

PROPERTY NUMBERS Total: 1

Property Type	Number
Application Number:	16470472

CORRESPONDENCE DATA

Fax Number:

Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.

Phone: 620 327 5882
Email: patents@agcocorp.com
Correspondent Name: AGCO CORPORATION, IP LEGAL JEFF ELLSWORT
Address Line 1: 420 W. LINCOLN BLVD.
Address Line 4: HESSTON, KANSAS 67062

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DATE SIGNED:	06/17/2019
	This document serves as an Oath/Declaration (37 CFR 1.63).

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source=US1640US_Filed_DclrtnandAsgnmt#page2.tif

DECLARATION AND ASSIGNMENT

THIS ASSIGNMENT is dated **December 16, 2016.**

I, **Benjamin Anson FANSHIER and Rex SCHERTZ** (hereinafter individually and collectively "the **Inventor**") believe that I am the original inventor or joint inventor of an Invention entitled:

IMPLEMENT CONTOURING TOOLBAR

(hereinafter "the **Invention**") which is subject to US Provisional Patent Application Number **62/435,118**, filed December 16, **2016**; Attorney Ref: **US16/40/US**; (hereinafter "the **Application**"). The above-identified application was made or authorized to be made by me. I hereby acknowledge that any wilful false statement made in this Declaration is punishable under 18 U.S.C. §1001 by fine or imprisonment of not more than five (5) years, or both.

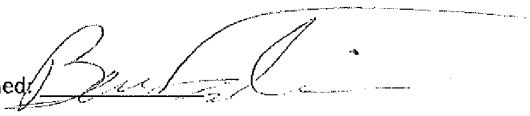
WHEREAS,

AGCO CORPORATION, a company incorporated according to the laws of the state of Delaware, having a registered address of 4205 River Green Parkway, Duluth, Georgia 30096, USA (hereinafter "the **Assignee**"), desires to acquire the entire right, title and interest throughout the world in and to said Invention and Application, including any and all divisions and continuations thereof, all rights of priority under the terms of the Paris Convention for the Protection of Industrial Property, and any and all Letters Patent which may be granted thereon, including any and all renewals, reissues and prolongations thereof.

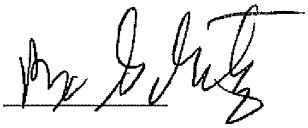
NOW, THEREFORE, in consideration of the sum of one dollar ($1.00) and other good and valuable consideration, the receipt, adequacy and sufficiency of which are hereby acknowledged, the Inventor hereby confirms the assignment to said Assignee, its assigns and legal representatives, the entire right, title and interest throughout the world, in and to said Invention and Application, including any and all divisions and continuations thereof, all rights of priority under the terms of the Paris Convention for the Protection of Industrial Property, and any and all Letters Patent which may be granted thereon, including any and all renewals, reissues and prolongations thereof, with all the rights, powers, privileges, and advantages in any way arising from or pertaining thereto, for and during the term or terms of any and all such Letters Patent, including the right to recover and take all such proceedings as may be necessary for recovery of damages or otherwise in respect of all infringements of any patent or patents granted pursuant to the Application.

TO HAVE HOLD USE AND ENJOY the same unto the Assignee their successors and assigns absolutely, to the intent that the grant of Letters Patent in any country shall be in the name of and shall vest in the Assignee.

IN WITNESS WHEREOF, executed by the undersigned

Signed: 

Name: **BENJAMIN ANSON FANSHIER**

Signed: 

Name: **REX SCHERTZ**

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(71) Applicant: **AGCO CORPORATION** [US/US]; 4205 River Green Parkway, Duluth Georgia (US).

(72) Inventors: **FANSHIER, Benjamin, Anson**; c/o Agco Corporation, 420 W. Lincoln Boulevard, Hesston, KS 67062-0969 (US). **SCHERTZ, Rex**; c/o Agco Corporation, 420 W. Lincoln Boulevard, Hesston, KS 67062-0969 (US).

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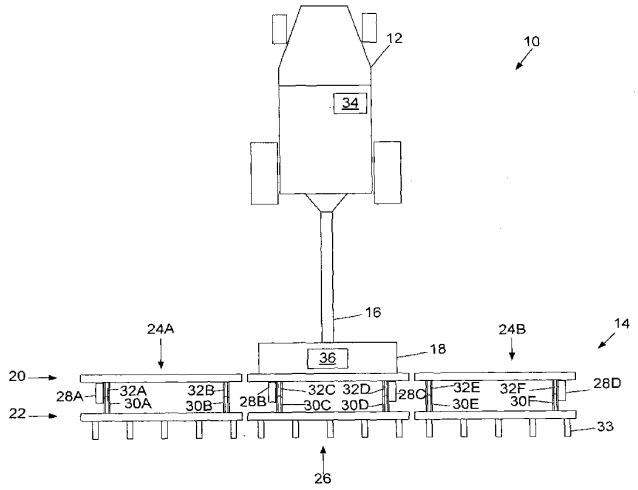


FIG. 1

(57) Abstract: In one embodiment, a frame member; a toolbar coupled to the frame member, the toolbar parallel to, and rearward of, the frame member; a row unit coupled to the toolbar; and an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar based on a sensed position of the toolbar.

IMPLEMENT CONTOURING TOOLBAR

TECHNICAL FIELD

[0001] The present disclosure is generally related to implements, and, more particularly, agricultural implements.

BACKGROUND

[0002] Implements, such as agricultural implements, are used to enable the engagement of tool attachments, including row units, with the soil for seeding, fertilizing, soil agitation, etc. As implements continue to get wider, they tend to have longer, rigid sections that do not handle uneven fields well. For instance, the field may comprise gullies and/or terraces that compromise the ability of the row units to properly operate in the field. As an example, when a planter encounters a terrace, frame wheels of the implement lift the row units up and out of the ground. Conversely, as the wheels go down the back of the terrace, the entire weight of the frame rests on the row units. In either case, possible detrimental results include insufficient crop yield due to seeds being planted too shallow or too deep.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] Many aspects of a contouring toolbar system of the present disclosure can be better understood with reference to the following drawings. The components in the drawings are not necessarily to scale, emphasis instead being placed upon clearly illustrating the principles of a contouring toolbar system. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the several views.

[0004] FIG. 1 is a schematic diagram that illustrates an example environment in which an embodiment of an example contouring toolbar system may be used.

[0005] FIG. 2 is a schematic diagram that illustrates, in side elevation view, an embodiment of an example contouring toolbar system with the toolbar in a flat or zero angle position.

[0006] FIG. 3 is a schematic diagram that illustrates, in fragmentary, side elevation view, an embodiment of an example contouring toolbar system with an implement comprising a toolbar in various angular positions.

[0007] FIGS. 4A-4B are schematic diagrams that illustrate, in fragmentary side elevation view, example field contours that trigger activation of the actuators of an embodiment of an example contouring toolbar system.

[0008] FIG. 5A is a block diagram that illustrates an example control system for an embodiment of an example contouring toolbar system.

[0009] FIG. 5B is a block diagram that illustrates an example controller for the control system of FIG. 5A.

[0010] FIG. 6 is a flow diagram that illustrates an embodiment of an example contouring toolbar method.

DESCRIPTION OF EXAMPLE EMBODIMENTS

Overview

[0011] In one embodiment, a frame member; a toolbar coupled to the frame member, the toolbar parallel to, and rearward of, the frame member; a row unit coupled to the toolbar; and an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar based on a sensed position of the toolbar.

Detailed Description

[0012] Certain embodiments of a contouring toolbar system and method are disclosed that enable an implement with row units to navigate across uneven fields while controlling a relationship of a row unit toolbar to the ground independently of the implement, frame-mounted wheels. In one embodiment, a contouring toolbar system comprises an actuator coupled between a frame member and a toolbar, the actuator retracted or extended based on the position of the toolbar as sensed by one or more sensors, which in turn maintains the coupled row units properly engaged with (e.g., seeding) the soil despite the contoured surfaces of the field. In some embodiments, the contouring toolbar system uses the sensed position of the toolbar to enable in-field planting operations, including lifting and turning at the end of the field.

[0013] Digressing briefly, most implement designs (e.g., planters) comprise a row unit toolbar that remains rigid as the implement moves over contoured field surfaces. When the implement is towed over a terrace, for instance, the row unit may be lifted off of the ground due to the rigid structures involved, resulting in a shallow or surface-level seed depth. In other instances, such as when the row unit is approaching a valley or gulley where the towing vehicle is at a higher elevation, the row unit may receive the entire weight load of the frame, resulting in a seed depth that is excessive and possibly causing damage to the row unit. In contrast, certain embodiments of a contouring toolbar system actively control the rotation of the row unit toolbar, adapting the rotation to follow the contoured field surfaces and hence always attempting to keep the row units engaged with the ground (e.g., by attempting to control the toolbar to be at a level position relative to the ground, or stated otherwise, maintain a relatively consistent elevation of the toolbar relative to ground).

[0014] Having summarized various features of certain embodiments of a contouring toolbar system of the present disclosure, reference will now be made in detail to the

detailed description of a contouring toolbar system as illustrated in the drawings. While the disclosure is described in connection with these drawings, there is no intent to limit it to the embodiment or embodiments disclosed herein. Further, although the description identifies or describes specifics of one or more embodiments, such specifics are not necessarily part of every embodiment, nor are all various stated advantages associated with a single embodiment. On the contrary, the intent is to cover all alternatives, modifications and equivalents included within the spirit and scope of a contouring toolbar system as defined by the appended claims. Further, it should be appreciated in the context of the present disclosure that the claims are not necessarily limited to the particular embodiments set out in the description.

[0015] Note that references hereinafter made to certain directions, such as, for example, "front", "rear", "left" and "right", are made as viewed from the rear of the implement looking forwardly.

[0016] Attention is now directed to FIG. 1, which is a schematic diagram that illustrates an example environment 10 in which an embodiment of a contouring toolbar system may be used. It should be appreciated by one having ordinary skill in the art, in the context of the present disclosure, that the environment 10 depicted in FIG. 1 is merely illustrative of one example environment, and that in some embodiments, other environments may be used. The example environment 10 includes a towing vehicle 12, in this example a tractor, towing an implement 14. The tractor 12 and implement 14 are depicted in fragmentary view. In some embodiments, other types of towing vehicles, including a self-propelled vehicle with an integrated implement (in lieu of a towed implement) or towing vehicles of other axle arrangements or other chassis configurations may be used, and hence are contemplated to be within the scope of the disclosure. The tractor 12 is coupled to the implement 14 using any known hitch and/or

tongue assembly 16. The implement 14 may support equipment 18, which may include one or more product containers, control components, pumps, reservoirs, among other equipment used to dispense product and control functioning of the implement and/or its attachments. The implement 14 comprises a chassis that includes parallel frame members 20, 22 in fore and aft arrangement, respectively, when deployed (e.g., when the implement 14 is towed in the forward direction). In the depicted example, the implement 14 is extended in a transverse direction relative to the direction of field traversal. The implement 14 is segmented into wing sections 24 (e.g., 24A, 24B) and a center section 26 that supports the equipment 18 and trails directly behind the tractor 12. In some embodiments, the implement 14 may be towed in an orientation where the center section 26 is physically offset from the center of the tractor 12. Although not detailed in FIG. 1, the wing sections 24 are respectively coupled to the center section 26 in pivotal manner, enabling a folding in a plane occupied by the tractor 12 and implement 14 for narrow-profile transport. In some embodiments, the folding of the wings 24 may be achieved outside of the plane of the tractor 12 and implement 14 (e.g., folded upward above the plane and rearward). Coupled to the frame members 20 of the wing sections 24A, 24B and center section 26 are respective wheels 28 (e.g., 28A to frame member 20 of wing section 24A, 28B-28C to frame member 20 of center section 26, and 28D to frame member 20 of wing section 24B). Some embodiments of a contouring toolbar system may use additional wheels (e.g., in tandem, as duals, or otherwise) in the same or different positions, or arrange the wheels in different locations than shown. For instance, in some embodiments, the wheels 28 may not be disposed between the frame members 20, 22. However, in the depicted example, the wheels 28 are disposed between the frame members 20, 22. Each frame member 20, 22 comprises bracket arms 42 (not designated in FIG. 1, but shown in FIG. 2) and 30 (e.g.,

30A-30F), respectively, that pivotably couple (e.g., via hinged joint to bracket arms of the frame member 20) the frame members 22 to the frame members 20.

[0017] Attached at the bracket arms 30A, 30B, 30E, 30F of the wing sections 24A, 24B are actuators 32 (e.g., 32A, 32B, 32E, and 32F), and attached to bracket arms 30C, 30D of the center section 26 are actuators 32 (e.g., 32C, 32D). Note that the location and/or quantity of bracket arms 30 and/or actuators 32 depicted in FIG. 1 is for illustration of one embodiment, and that in some embodiments, different and/or additional quantities and/or locations may be used. The actuators 32 may be configured as single rod hydraulic actuators (e.g., a linear-acting, piston and rod assembly, though in some embodiments, rotary actuation may be used). In some embodiments, the actuators 32 may be configured as either pneumatic, electric, magnetic, or electromagnetic actuators. The actuators 32 are configured to rotate the frame members 22 (e.g., the toolbar) of the wing and center sections 24, 26 to/from any position along a range of positions throughout an approximately one hundred ten (110) degree range, though in some embodiments, the range may be more or less. For instance, for field work and transport operations, the actuators 32 may rotate the frame members 22 relative to the frame members 20 to angular positions of zero (0) degrees (e.g., working a level or even surface of the field), approximately 20-40 degrees (e.g., raising the frame member 22 to clear a minimum recommended headlands elevation or a maximum recommended headlands rotation, respectively), and approximately 90 degrees (e.g., for narrow transport). Note that the angular position is construed relative to a horizontal plane of the frame members 20. The actuators 32 are also configured to rotate the frame members 22 of the wing and center sections 24, 26 to angular positions below the center or zero degree position. For instance, in one embodiment, the actuators 32 may be extended (e.g., the rods extended) to an angular position of

approximately 10 degrees below the zero degree reference (below level), such as to accommodate hills traversals, or even greater angles (as suggested by the 25 degree angle in FIG. 3, described below. In other words, the angular span of positions to which the frame member 22 may be rotated relative to the frame member 20 comprises an obtuse angle (e.g., over 90 degrees).

[0018] Removeably attached to the frame members 22 and arranged rearward to the frame members 22 are soil working tools 33, including row units that seed, fertilize, and/or agitate the soil. Though shown completely rearward of the frame members 22, in some embodiments, the row units 33 may be alternately staggered, with the row units 33 position completely rearward and slightly forward and rearward of the frame member 22. Other configurations may be used, as should be appreciated by one having ordinary skill in the art.

[0019] The tractor 12 also comprises a controller 34 that causes actuation of the actuators 32 based on operator input, software and/or device input, and/or sensor signals as explained further below. For instance, where the actuators 32 are configured as hydraulic cylinders, hydraulic fluid control may be achieved via a control component 36 that comprises one or more manifolds, each comprising one or more control valves that control a state of the hydraulic cylinders 32 (e.g., control the change in pressure and/or change in flow rate of hydraulic fluid through the cylinders). Actuation of the control component 36 may be achieved wirelessly or via wired connection (e.g., Isobus) according to commands from the controller 34.

[0020] Note that the contouring toolbar system may include the components described for the entire environment 10 in some embodiments, or a subset of the described components in some embodiments.

[0021] Having generally described an example environment 10 in which an embodiment of a contouring toolbar system may be used, attention is directed to FIG. 2, which illustrates an example implement 14 with a level or zero angle position of the frame member 22 relative to the frame member 20. In the depicted example, the wing sections 24 are folded forward relative to the center section 26. Only one row unit 33A is depicted as attached to the frame member 22, with the understanding that additional row units would typically be attached along the frame members 22. Referring to wing section 24A in particular with primary focus on the components associated with the actuator 32A, with the understanding that a similar description applies to the rotational components of the rest of the wing section 24A, the wing section 24B, and the center section 26 but omitted here for brevity, the frame member 22 comprises a toolbar 38. The toolbar 38 may be rectangular in shape, and comprises in one embodiment on the rearward side, tool brackets 40 that are uniformly spaced along the toolbar 38. The tool brackets 40 are secured to the toolbar 38 according to any known securement mechanism, including weld, bolts, etc. The tool brackets 40 facilitate attachment of respective soil working tools, such as row units 33A. On the opposing side of the toolbar 38 are the bracket arms 30, which extend forwardly from the toolbar 38. The bracket arms 30 couple via a hinged joint to rearward extending bracket arms 42 extending from the frame member 20.

[0022] Enabling rotation of the frame members 20, 22 are the plural actuators 32 (e.g., 32A). In one embodiment, the actuator 32A (as with the other actuators 32) is attached to an upper portion of the frame member 20 (e.g., at or proximal to the upper portion of the bracket arm 42) and the bracket arm 30 opposite the toolbar 38. Other locations may be used as long as the rotation of the toolbar 38 is achieved relative to the frame member 20. In FIG. 2, the actuators 32 have rotated the toolbar 38 to a zero (0) degree

angle relative to the horizontal plane of a transverse component of the frame member 20. In this orientation, row units 33A may be operational and engaged with the soil.

[0023] Referring now to FIG. 3, shown is an embodiment of an example contouring toolbar system with an implement 14A comprising a toolbar 38A in various angular positions. The implement 14A shown in FIG. 3 may be similarly structured and configured as implement 14 shown in FIGS. 1-2. The implement 14A is depicted diagrammatically with the frame member 20A comprising a bracket arm 42A, the bracket arm 42A pivotably coupled to the toolbar 38A (e.g., via a hinged connection at the bracket arm 30 (FIG. 2) and the bracket arm 42). The actuator 32A-1 provides for retracting and extending movements that cause the toolbar 38A to rotate relative to the frame member 20A. The toolbar 38A is coupled to the row unit 33B via a linkage 44. The linkage 44 is comprised of a parallelogram structure, as is known, and permits limited parallelogram motion between the toolbar 38A and the row unit 33B. The wheel 28A-1 is coupled to the frame member 20 in known manner, similar to that shown in FIG. 2, though as described above, some embodiments may use different chassis configurations and hence are contemplated to be within the scope of the disclosure. The implement 14A is shown resting on a field 46, the field 46 shown as a level surface and also angled to represent where the actuator 32A-1 needs to drop (extend) the toolbar 38A to follow the varying contours of the field surface. One of the points FIG. 3 is illustrating is that an embodiment of a contouring toolbar system is persistently attempting to control the "X" dimension to keep the row unit 33B engaged with the ground (e.g., to enable proper seeding, agitation, etc.). The "X" dimension is referenced relative to a location proximal to the row unit connection to the toolbar 38A (e.g., via the parallelogram linkage connection) relative to the ground, and hence corresponds to the toolbar position relative to the ground.

[0024] The toolbar 38A (38A in zero-angle position) is shown in multiple angular positions, including toolbar 38A-1, toolbar 38A-2, and toolbar 38A-3. At toolbar 38A-1, the actuator 32A-1 has raised (e.g., via full retraction of the corresponding rod) the toolbar 38A-1 to approximately 90 degrees (e.g., relative to a level surface or a longitudinal axis of the frame member 20A) for narrow transport.

[0025] At toolbar 38A-2, the actuator 32A-1 has raised the toolbar 38A-2 to approximately 10 degrees relative to a level surface or a longitudinal axis of the frame member 20A. Such actuation may occur, for instance, if the row unit 33B was traversing the backside of a terrace to attempt to control the X dimension relative to the ground surface to keep the row unit 33B engaged (which also may prevent excessive loads on the row unit 33B). Also, for field operations, an intermediate position of the toolbar 38A proximal to that depicted in FIG. 3 for toolbar 38A-2 may be sensed for permitting headland turning. For instance, the toolbar 38A may be raised to approximately 20-30 degrees, the rotation sensed to enable the controller 34 to stop at that operational position.

[0026] At toolbar 38A-3, the actuator 32A-1 has lowered the toolbar 38A-3 below zero degrees (e.g., approximately 10 degrees below the zero angular position). Such an actuation may occur if the row unit 33B was traveling on the upside of a hill as in the depicted example (the row unit 33B not actually shown traversing the slope of 25 degrees for ease of illustration). In other words, the actuation serves to attempt to maintain the X dimension of the toolbar 38A (e.g., and similarly, the row unit 33B), which in turn also avoids lifting the row unit 33B off of the surface of the field 46. As set forth above, additional actuation may be performed for even greater changes in traversed field contour (e.g., 25 degrees) in order to control the "X" dimension. As illustrated in FIG. 3, the toolbar position is adjusted to attempt to maintain a level operating position

relative to the contour of the surface and to enable proper engagement of the row unit 33B with the field 46.

[0027] In one embodiment, the control of the actuation is based on one or more sensors that sense the position of the toolbar 38A. The sensors may be disposed for each row unit 33B of a planter, or one or more sensors may be used for all of the row units 33B. In general, to enable the toolbar 38A (and hence toolbar 38A) to follow the contour of the field, sensor information is received about the (relative) position of the toolbar 38A (and by extension, the relative position of the row unit 33B) relative to the ground. A row unit sensor, such as sensor 50, is used for the contouring operation. In one embodiment, at least one row unit sensor 50 is used, though in some embodiments, there may be a row unit sensor 50 per every row unit 33B. Further, toolbar rotation for field operations may also rely on sensor information. For instance, at the end of a "pass", the row units 33B are lifted to a headland position, the towing vehicle turns around, and the row units 33B are lowered again to engage the field for the next pass. This operation is referred to as headland turning, which involves transitioning from a contouring or field operation position of the toolbar 38A (and hence row units 33B) to a pre-configured (or in some embodiments, operator-configured) intermediate angle of the toolbar 38A. Headland turning benefits from the use of sensor information about the toolbar position relative to the frame 20A. In one embodiment, one or more sensors, including sensor 48, may be used to provide this information. There may be a single sensor 48 corresponding to plural row units, or multiple sensors 48 (e.g., per row unit 33B). The sensor 48 may also be used for enabling transport, such as triggering an electronic stop (from signaling of the controller 34) when the toolbar 38A has reached the transport position (e.g., approximately 90 degrees).

[0028] The sensor 48 may be positioned proximal to the pivot point of the bracket arm 42 of the frame member 20 and where the toolbar 38A couples to the bracket arm 42. In this position, the sensor 48 senses the angular position and/or change in angular position between the toolbar 38A and the frame member 20. The sensor 50 may be located at the pivot point between the linkage 44 and the toolbar 38A, and used to sense the position of the toolbar 38A (and hence the position of the row unit 33B) relative to the ground. That is, the contouring toolbar system attempts to follow the contour of the field 46 (controlling the "X" dimension) as pivoting areas begin to move in response to the changes in field surfaces. In short, the contouring toolbar system attempts to keep the "X" dimension or the toolbar 38A relatively constant relative to the ground and also control the travel of the toolbar 38A in a manner that keeps the row unit 33B engaged with the ground.

[0029] In one embodiment, the sensors 48 and 50 may each be configured as a rotary encoder that provides an angle value for every programmed amount of sensed rotation. For instance, the rotary encoder may be optically-based, and for every detected rotation or click (e.g., assuming a single rotation or "click' per single degree, though other resolutions may be used), the controller 34 (FIG. 1) can track based on a signal from the sensors 48, 50 at what angle the toolbar 38A has rotated relative to the frame 20A (from sensor 48) and the ground (from sensor 50).

[0030] For contouring control, the controller 34 may be programmed to trigger actuation of the actuator 32A-1 based on a sensed (e.g., from sensor 50) defined threshold degree value away from a zero degree reference, providing a buffer to excessive actuations. In some embodiments, the rate of rotation may also trigger the controller 34 to communicate the speed of actuation. For instance, at a single click of the sensor 50, the controller 34 may communicate an actuation speed of a defined percentage (e.g.,

1%) or value, and a 5 degree rotation may trigger communication of a faster speed (e.g., 50%) to serve in an anticipatory manner to avoid wide or rapid stroke of the actuator 32A-1.

[0031] In some embodiments, the sensors 48 and/or 50 may be configured as non-contact type, electromagnetic sensors, including ultrasonic, radar, or lidar type sensors, or as a combination of angular position and non-contact types. For instance, the electromagnetic sensors may detect the position of the ground (e.g., via transmittal to and reflection from the ground) relative to the toolbar 38A and communicate a signal to the controller 34 to cause adjustment of the toolbar 38A to control (e.g., maintain) the toolbar-to-ground dimension X substantially constant. Note that in some embodiments, the electromagnetic sensors may be located in other locations, including at the row unit 33B. the electromagnetic sensors may be configured to detect an absolute elevation of the toolbar 38A relative to ground or a change in elevation relative to ground.

[0032] Attention is now directed to FIGS. 4A-4B, which illustrate, diagrammatically, example operations of an embodiment of a contouring toolbar system. Shown is a tractor 52 coupled to a planter frame 54. The planter frame 54 is pivotably coupled to a toolbar 56 via bracket arms 58, 60. Coupled between bracket arms 58, 60 is actuator 62. The toolbar 56 is further coupled to the row unit 64 via linkage 66. Note that the planter frame 54 may be similar to the frame member 20 (FIG. 1), and the bracket arms 58, 60 may be similar to bracket arms 42 and 30 (FIGS. 1-2). Also, the toolbar 56 may be similar to toolbar 38 (FIG. 3), and the row unit 64 and linkage 66 may be similar to the row unit 33 (FIGS. 1-2) and linkage 44 (FIG. 3), respectively. Referring to FIG. 4A, the planter frame 54 is shown commencing a downward slope of a hill 68. An angle sensor 70 positioned proximal to the toolbar 56 and row unit 64 and senses a change in position of the toolbar 56 (and hence row unit 64) relative to the ground and signals to

the controller 34. The controller 34, in turn, processes the received signal and signals to a control component 72 to change a state of the actuator 62 (e.g., change in pressure and/or fluid flow in the case of a hydraulic actuator) according to the determined angular change, resulting in the rod of the actuator 62 extending to rotate the toolbar 56 downward to adjust to the change in contour. Note that in conventional systems, the row unit may be lifted off of the ground due to the rigid structures involved, resulting in insufficient planting depth.

[0033] Referring to FIG. 4B, the planter frame 54 is traversing up a slope while the row unit 64 is heading down to a valley 69 or gulley. The sensor 70 senses the change in angular position of the toolbar 56 (and row unit 64) relative to the ground and signals to the controller 34. The controller 34 in turn signals to the control component 72 according to the determined angular change, resulting in the rod of the actuator 62 being retracted to cause the toolbar 56 to rotate up to adjust to the change in contour. In a conventional system, the row unit may lose engagement with the field, resulting in the deposit of seed at too much depth, affecting yield negatively. Also, the row unit in a conventional system may be exposed to excessive forces (e.g., possibly causing the row unit to damage or break off).

[0034] Reference is now made to FIG. 5A, which illustrates an embodiment of an example control system 74 used for controlling operations of the toolbar rotations for an embodiment of a contouring toolbar system. It should be appreciated within the context of the present disclosure that some embodiments may include additional components or fewer or different components, and that the example depicted in FIG. 5A is merely illustrative of one embodiment among others. The control system 74 may be located entirely on the implement (e.g., implement 14, FIG. 1), distributed among the towing vehicle (e.g., tractor 12, FIG. 1) and the implement, or among additional devices (e.g.,

remote control). Further, though depicted using a single controller 34, in some embodiments, the control system 74 may be comprised of plural controllers similarly configured to controller 34. In the depicted embodiment, the controller 34 is coupled via one or more networks, such as network 76 (e.g., a CAN network or other network, such as a network in conformance to the ISO 11783 standard, also referred to as "Isobus"), to control components 78, one or more sensors 80, a user interface 82, a communications interface (COMM INT) 84, and a global navigation satellite systems (GNSS) receiver 86. The control components 78 may be configured similarly to control components 36 (FIG. 1) and 72 (FIG. 4A). The sensors 80 may be configured similarly to sensors 48, 50 (FIG. 3), and/or 70 (FIG. 4A). Note that control system operations are primarily disclosed herein in the context of control via the single controller 34, with the understanding that additional controllers may be involved in one or more of the disclosed functionality in some embodiments.

[0035] The control components 78 may comprise a manifold comprising one or more or a combination thereof of control valves, air valves, switches, relays, solenoids, motors, etc., to cause actuation of the actuators (e.g., actuator 32, FIG. 2) that control the rotation of the toolbars (e.g., toolbar 38, FIG. 2). In the depicted example, the control components 78 comprises one or more multi-position (e.g., 3-position) hydraulic control valves with coupled solenoids, the solenoids receiving signaling from the controller 34 and causing movement of a spool or poppet(s) of the control valves. The control valves in turn regulate the flow into and out of actuators that, in one embodiment, comprise linear acting, rod and single piston-type hydraulic cylinders 88. The regulation of the flow and/or pressure across the piston enables the retraction or extension of the rod as needed. As suggested above, the control technology may be comprised of pneumatic, electric, magnetic, or electromagnetic.

[0036] The sensors 80 may be comprised of angle positioning sensors (e.g., rotary encoders, including optical based or other electromagnetic frequencies), or non-contact type sensors, including radar, acoustic, lidar, among others. In some embodiments, a combination of these types of sensors may be used. The sensors 80 are used to determine the position of the row unit toolbar, including via the determination of the distance between the toolbar and the ground surface and/or the angular position of the toolbar relative to the frame member (e.g., frame member 20, FIG. 1).

[0037] The user interface 82 may include one or more components, including one or any combination of a keyboard, mouse, microphone, touch-type or non-touch-type display device (e.g., display monitor or screen), joystick, steering wheel, FNR lever, and/or other devices (e.g., switches, immersive head set, etc.) that enable input and/or output by an operator. For instance, in some embodiments, the user interface 82 may be used to present on a display screen implement control options (e.g., drop the toolbar for engagement of the row units with the soil, raise the toolbar for headlands, raise the toolbar for transport, etc.) for the operator to choose from, and/or the user interface 82 may provide feedback of when these actions are taken or about to be taken when performed automatically (e.g., providing an operator the opportunity to reject or acknowledge or merely observe). In some embodiments, the feedback may be in the form of recommendations to the operator for taking certain actions. In one embodiment, a visual of the implement may be presented on the screen, with the sensor data communicated in the form of data and/or a visual of the movement of the toolbar relative to the field contour. In some embodiments, the functions of manually rotating the toolbar to various operational positions may be performed via actuation of a switch, lever, handle, etc., or verbally commanded.

[0038] The communications interface 84 may comprise a wireless network interface module (e.g., including an RF and/or cellular modem) for wireless communication among other devices of the towing vehicle/implement combination or with remote devices (e.g., external from the implement and towing vehicle). The communications interface 84 may work in conjunction with communication software (e.g., including browser software) in the controller 34, or as part of another controller coupled to the network 76 and dedicated as a gateway for wireless communications with other devices or networks. The communications interface 84 may comprise MAC and PHY components (e.g., radio circuitry, including transceivers, antennas, etc.), as should be appreciated by one having ordinary skill in the art.

[0039] The GNSS receiver (GNSS RX) 86 may be comprised of a GPS receiver, for instance, to receive location coordinates of the towing vehicle and/or implement. The GNSS receiver 86 may function in cooperation with field maps stored locally in the controller 34 (or accessed from a remote server) to enable detection of headlands, roads, field entrances, and/or locations for surface features (e.g., hills, gullies), etc. For instance, the use of locations of surface features may be used in part to enable the controller 34 to improve anticipation of the extent (e.g., speed) of actuation for rotating the toolbar.

[0040] FIG. 5B further illustrates an example embodiment of the controller 34. One having ordinary skill in the art should appreciate in the context of the present disclosure that the example controller 34 is merely illustrative, and that some embodiments of controllers may comprise fewer or additional components, and/or some of the functionality associated with the various components depicted in FIG. 5B may be combined, or further distributed among additional modules, in some embodiments. It should be appreciated that, though described in the context of residing in a towing

vehicle (e.g., the tractor 52 (FIG. 4A), in some embodiments, the controller 34, or all or a portion of its corresponding functionality, may be implemented at the implement (e.g., implement 14, FIG. 1) or in a computing device or system located external to the tractor and/or implement. Referring to FIG. 5B, with continued reference to FIG. 5A, the controller 34 or electronic control unit (ECU) is depicted in this example as a computer, but may be embodied as a programmable logic controller (PLC), field programmable gate array (FPGA), application specific integrated circuit (ASIC), among other devices. It should be appreciated that certain well-known components of computers are omitted here to avoid obfuscating relevant features of the controller 34. In one embodiment, the controller 34 comprises one or more processors (also referred to herein as processor units or processing units), such as processor 90, input/output (I/O) interface(s) 92, and memory 94, all coupled to one or more data busses, such as data bus 96. The memory 94 may include any one or a combination of volatile memory elements (random-access memory RAM, such as DRAM, and SRAM, etc.) and nonvolatile memory elements (e.g., ROM, Flash, hard drive, EPROM, EEPROM, CDROM, etc.). The memory 94 may store a native operating system, one or more native applications, emulation systems, or emulated applications for any of a variety of operating systems and/or emulated hardware platforms, emulated operating systems, etc.

[0041] In the embodiment depicted in FIG. 5B, the memory 94 comprises an operating system 98 and contouring toolbar control software (SW) 100. It should be appreciated that in some embodiments, additional or fewer software modules (e.g., combined functionality) may be deployed in the memory 94 or additional memory. For instance, the memory 94 may also include browser software and/or communications software. In some embodiments, a separate storage device may be coupled to the data bus 96, such

as a persistent memory (e.g., optical, magnetic, and/or semiconductor memory and associated drives).

[0042] The contouring toolbar control software (SW) 100 receives input from the user interface 82 (via the I/O interfaces 92 and network 76) and sensor input from the sensors 80 (via the I/O interfaces 92 and network 76). In some embodiments, the contouring toolbar control software (SW) 100 may receive additional input, including location coordinates from the GNSS receiver, such as to identify certain surface features, headlands, and/or roads to trigger certain toolbar rotations. As suggested above, the sensor input is converted to an actuation signal (including a magnitude and optionally a rate), which is used to cause a suitable stroke to meet the required compensatory motion by the actuator (e.g., cylinders 88) to adjust the toolbar rotation. In some embodiments, operator input at the user interface 82 is also communicated and translated to an actuation signal to maneuver the toolbar to an appropriate position (e.g., to raise the toolbar at a headland, for narrow transport, etc.). The contouring toolbar control software (SW) 100 also provides user interface functionality to provide feedback of certain toolbar rotations, with or without the ability for the operator to intervene as explained previously.

[0043] Execution of the contouring toolbar control software (SW) 100 may be implemented by the processor 90 under the management and/or control of the operating system 98. The processor 90 may be embodied as a custom-made or commercially available processor, a central processing unit (CPU) or an auxiliary processor among several processors, a semiconductor based microprocessor (in the form of a microchip), a macroprocessor, one or more application specific integrated circuits (ASICs), a plurality of suitably configured digital logic gates, and/or other well-known electrical

configurations comprising discrete elements both individually and in various combinations to coordinate the overall operation of the controller 34.

[0044] The I/O interfaces 92 provide one or more interfaces to the network 76 and other networks. In other words, the I/O interfaces 92 may comprise any number of interfaces for the input and output of signals (e.g., analog or digital data) for conveyance of information (e.g., data) over the network 76. The input may comprise input by an operator (local or remote) through the user interfaces 82 and input from signals carrying information from one or more of the components of the control system 74, as explained above.

[0045] When certain embodiments of the controller 34 are implemented at least in part with software (including firmware), as depicted in FIG. 5B, it should be noted that the software can be stored on a variety of non-transitory computer-readable medium for use by, or in connection with, a variety of computer-related systems or methods. In the context of this document, a computer-readable medium may comprise an electronic, magnetic, optical, or other physical device or apparatus that may contain or store a computer program (e.g., executable code or instructions) for use by or in connection with a computer-related system or method. The software may be embedded in a variety of computer-readable mediums for use by, or in connection with, an instruction execution system, apparatus, or device, such as a computer-based system, processor-containing system, or other system that can fetch the instructions from the instruction execution system, apparatus, or device and execute the instructions.

[0046] When certain embodiment of the controller 34 are implemented at least in part with hardware, such functionality may be implemented with any or a combination of the following technologies, which are all well-known in the art: a discrete logic circuit(s) having logic gates for implementing logic functions upon data signals, an application

specific integrated circuit (ASIC) having appropriate combinational logic gates, a programmable gate array(s) (PGA), a field programmable gate array (FPGA), etc.

[0047] Having described some example embodiments of a contouring toolbar system, it should be appreciated in view of the present disclosure that one embodiment of a computer-implemented method for an implement that comprises a toolbar that has row units secured thereto, the method for adjusting a rotation of the toolbar based on a contour of a field on which the implement traverses, the method denoted as method 102 and illustrated in FIG. 6, comprises, at a controller (e.g., controller 34, FIG. 5B): receiving an indication of a first angle change of the toolbar relative to ground (104); causing an actuator that pivotably couples the toolbar to the frame member to retract based on the indication of the first angle change (106); receiving an indication of a second angle change of the toolbar relative to the ground (108); and causing the actuator to extend based on the indication of the second angle change (110).

[0048] Any process descriptions or blocks in flow diagrams should be understood as representing modules, segments, or portions of code which include one or more executable instructions for implementing specific logical functions or steps in the process, and alternate implementations are included within the scope of the embodiments in which functions may be executed out of order from that shown or discussed, including substantially concurrently or in reverse order, depending on the functionality involved, as would be understood by those reasonably skilled in the art of the present disclosure.

[0049] It should be emphasized that the above-described embodiments of a contouring toolbar system are merely possible examples of implementations, merely set forth for a clear understanding of the principles of the contouring toolbar system. Many variations and modifications may be made to the above-described embodiment(s) of the

contouring toolbar system without departing substantially from the spirit and principles of the disclosure. All such modifications and variations are intended to be included herein within the scope of the disclosure and protected by the following claims.

CLAIMS

At least the following is claimed:

1. A system, comprising:

a frame member;

a toolbar coupled to the frame member, the toolbar parallel to, and rearward of, the frame member;

a row unit coupled to the toolbar; and

an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar based on a sensed position of the toolbar.

2. The system of claim 1, further comprising a first sensor coupled to the toolbar, the first sensor configured to sense a position of the toolbar relative to ground, the position of the toolbar corresponding to a position of the row unit relative to the ground.

3. The system of claim 2, further comprising a second sensor coupled to the frame member, the second sensor configured to sense an angle of the toolbar relative to the frame member.

4. The system of claim 3, further comprising a controller, the controller configured to receive first and second signals from the first and second sensors and cause actuation of the actuator based on the first and second signals.

5. The system of claim 4, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

6. The system of claim 5, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

7. The system of claim 4, wherein the controller is further configured to cause adjustment of a rate of rotation based on the first signals from the first sensor.

8. The system of claim 2, further comprising a controller, the controller configured to receive a signal from the first sensor and cause actuation of the actuator based on the signal.

9. The system of claim 8, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

10. The system of claim 9, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

11. The system of claim 8, wherein the controller is further configured to cause adjustment of a rate of rotation based on the signal from the first sensor.

12. The system of claim 1, wherein the sensed position is relative to a field surface, further comprising one or more electromagnetic sensors coupled to the frame member, the toolbar, or a combination of the frame member and the toolbar, the one or more electromagnetic sensors configured to sense an absolute elevation or change in elevation between the field surface and the toolbar or a combination of both the frame member and the toolbar.

13. The system of claim 12, further comprising a controller, the controller configured to receive one or more signals from the one or more electromagnetic sensors and cause actuation of the actuator based on the one or more signals.

14. The system of claim 13, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

15. The system of claim 14, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

16. The system of claim 13, wherein the controller is further configured to cause adjustment of a rate of rotation based on the one or more signals from the one or more electromagnetic sensors.

17. The system of claim 12, wherein the one or more electromagnetic sensors comprise ultrasonic, lidar, or radar sensors.

18. The system of claim 1, wherein the actuator is configured to rotate the toolbar throughout an obtuse angle range.

19. A control system for an implement comprising a frame member and a toolbar rearward of and parallel to the frame member, wherein secured to the toolbar are plural row units, the control system comprising:

a controller;

one or more sensors configured to sense a position of the toolbar; and

an actuator coupled between the frame member and the toolbar, wherein the controller is configured to receive a signal or signals from the one or more sensors indicating the position and cause the actuator to rotate the toolbar based on the sensed position of the toolbar.

20. A computer-implemented method for an implement that comprises a toolbar that has row units secured thereto, the method for adjusting a rotation of the toolbar based on a contour of a field on which the implement traverses, the method comprising:

at a controller:

receiving an indication of a first angle change of the toolbar relative to ground;

causing an actuator that pivotably couples the toolbar to the frame member to retract based on the indication of the first angle change;

receiving an indication of a second angle change of the toolbar relative to the ground; and

causing the actuator to extend based on the indication of the second angle change.

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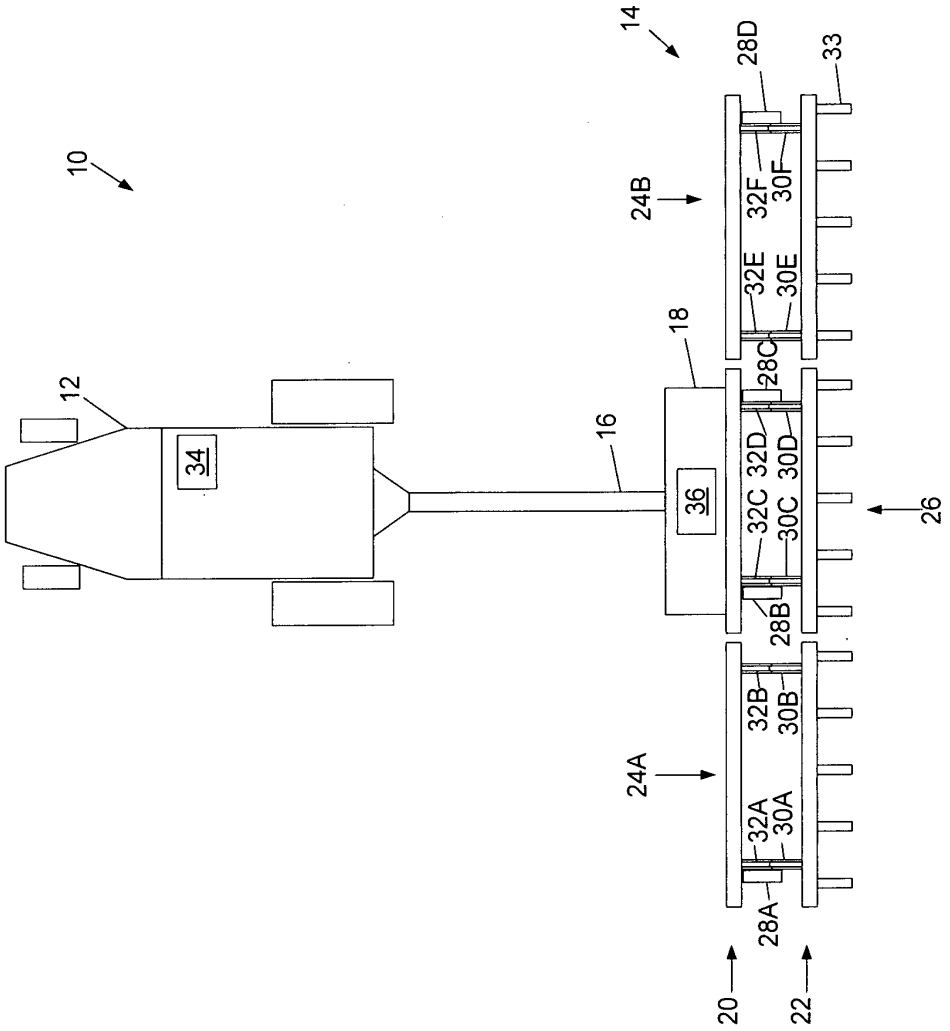

10
12
34
16
18
36
14
24B
24A
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28A
32F
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FIG. 1

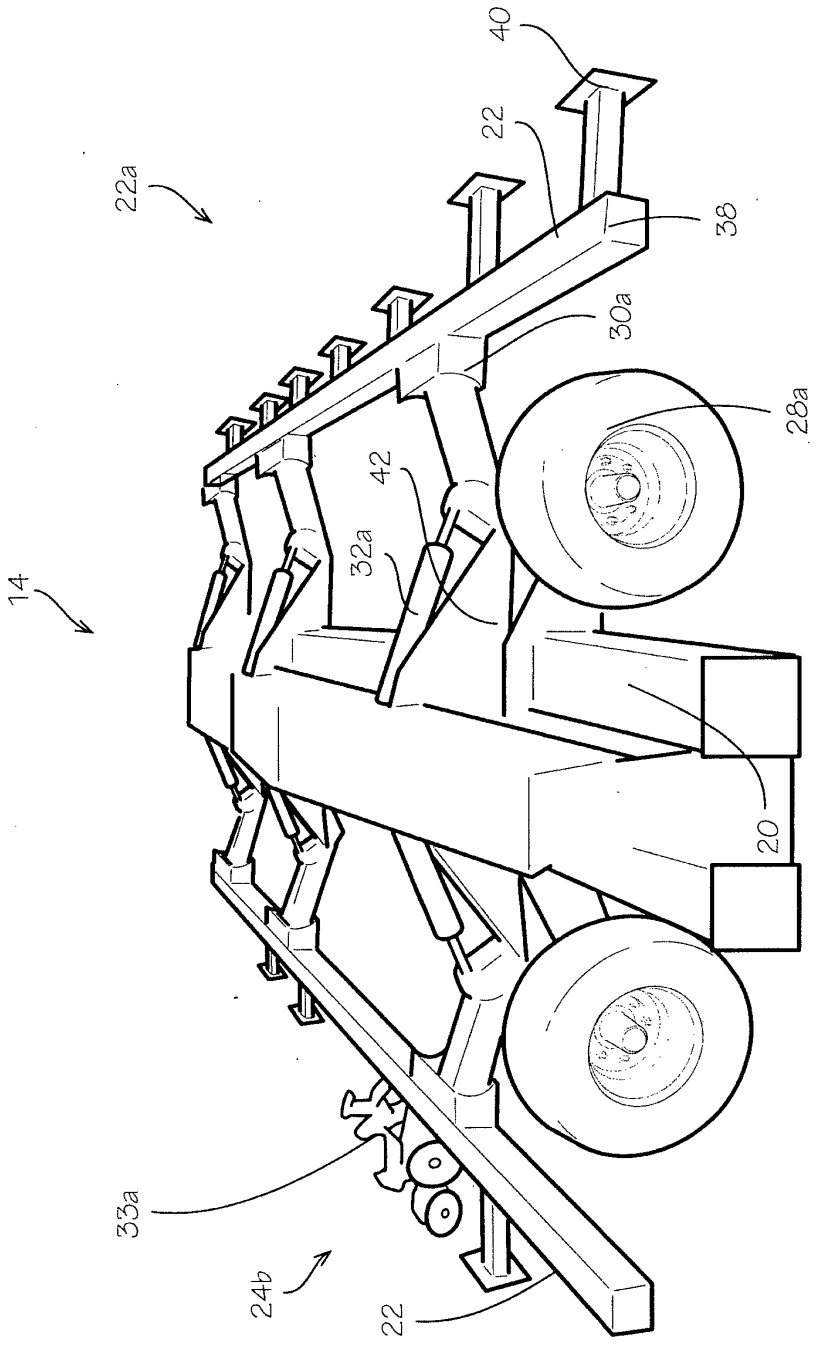


FIG. 2

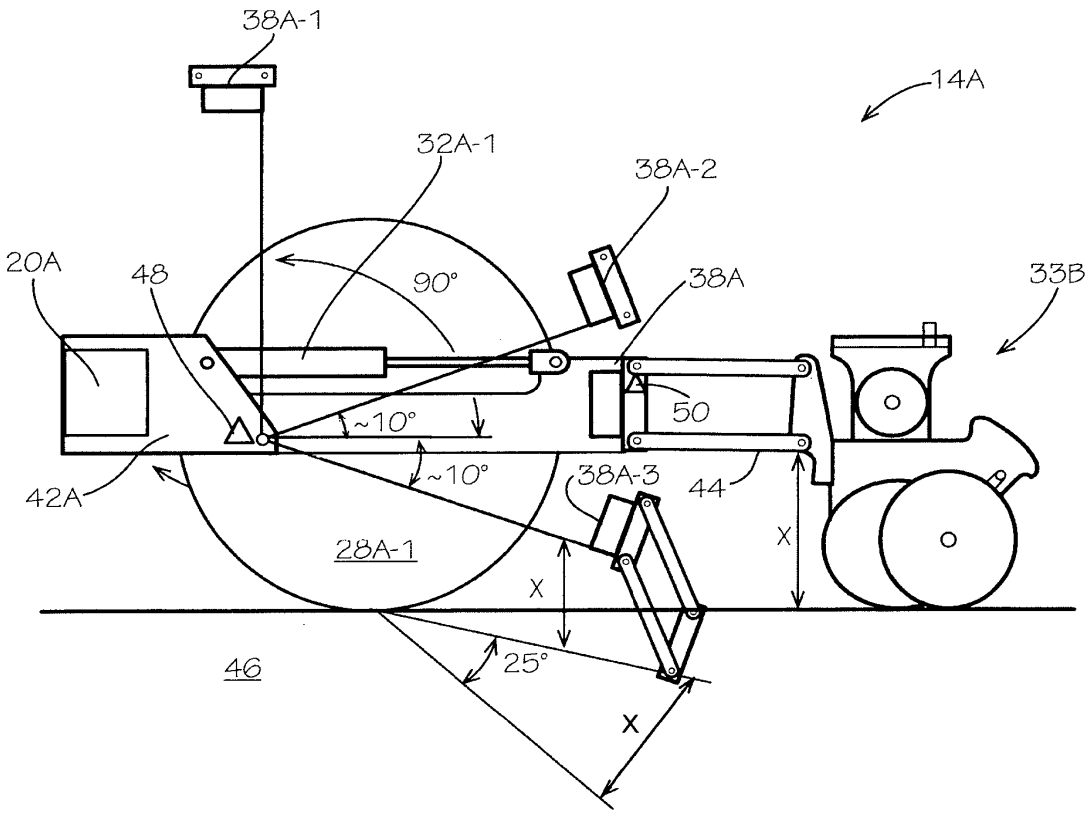

38A-1
14A
32A-1
38A-2
20A
48
90°
38A
33B
50
~10°
~10°
38A-3
44
42A
28A-1
X
X
46
25°
X

FIG. 3

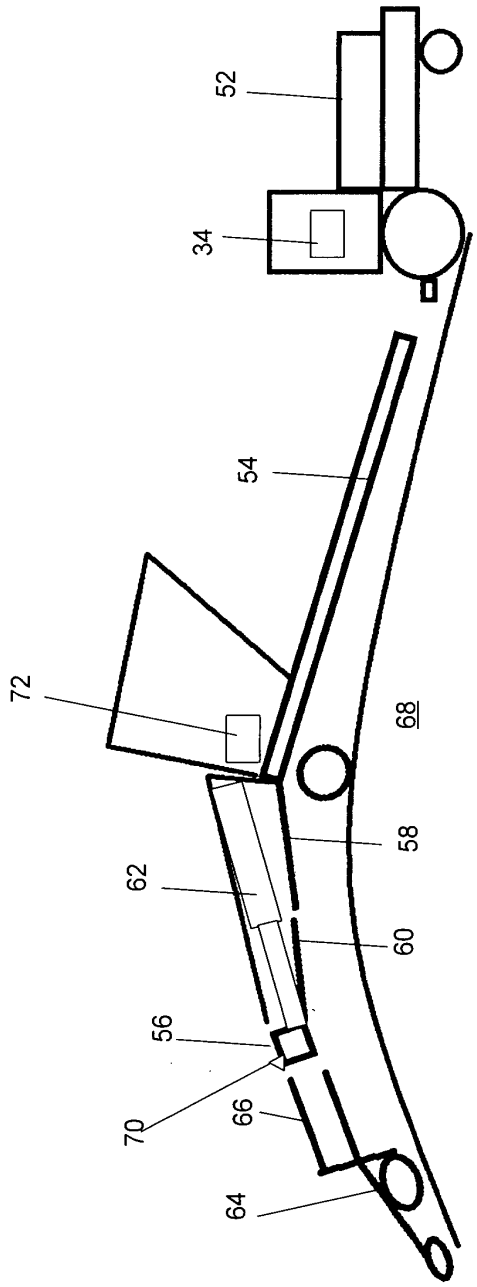


FIG. 4A

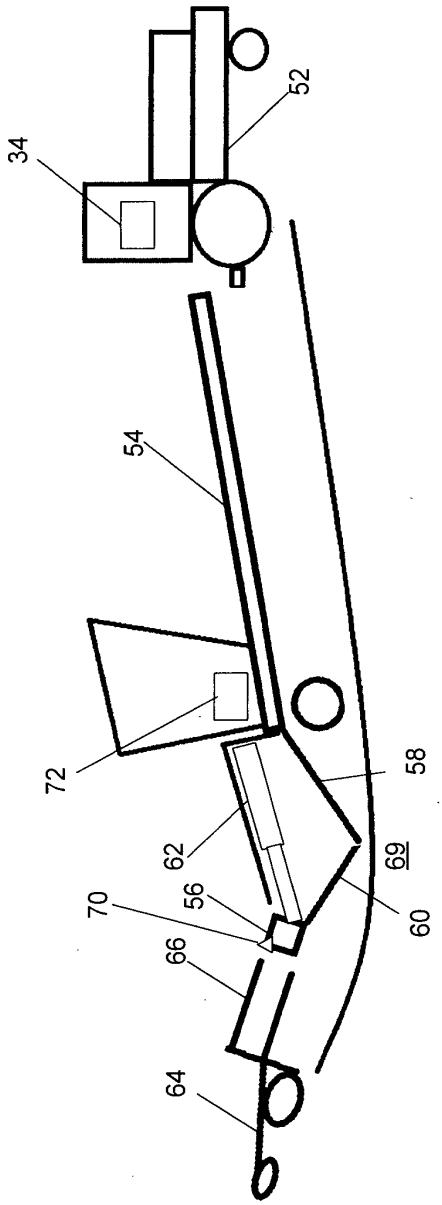


FIG. 4B

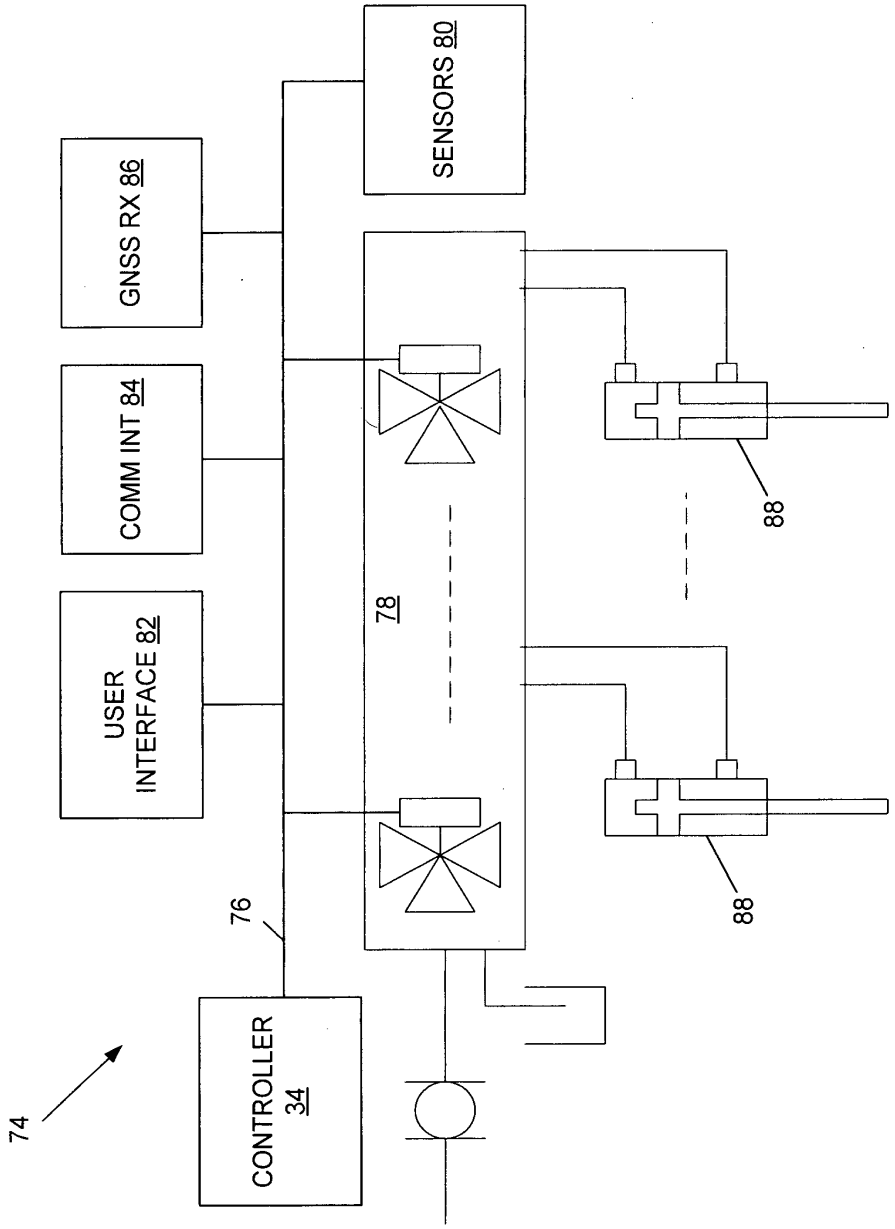

SENSORS 80
GNSS RX 86
COMM INT 84
USER INTERFACE 82
78
88
88
76
CONTROLLER 34
74

FIG. 5A

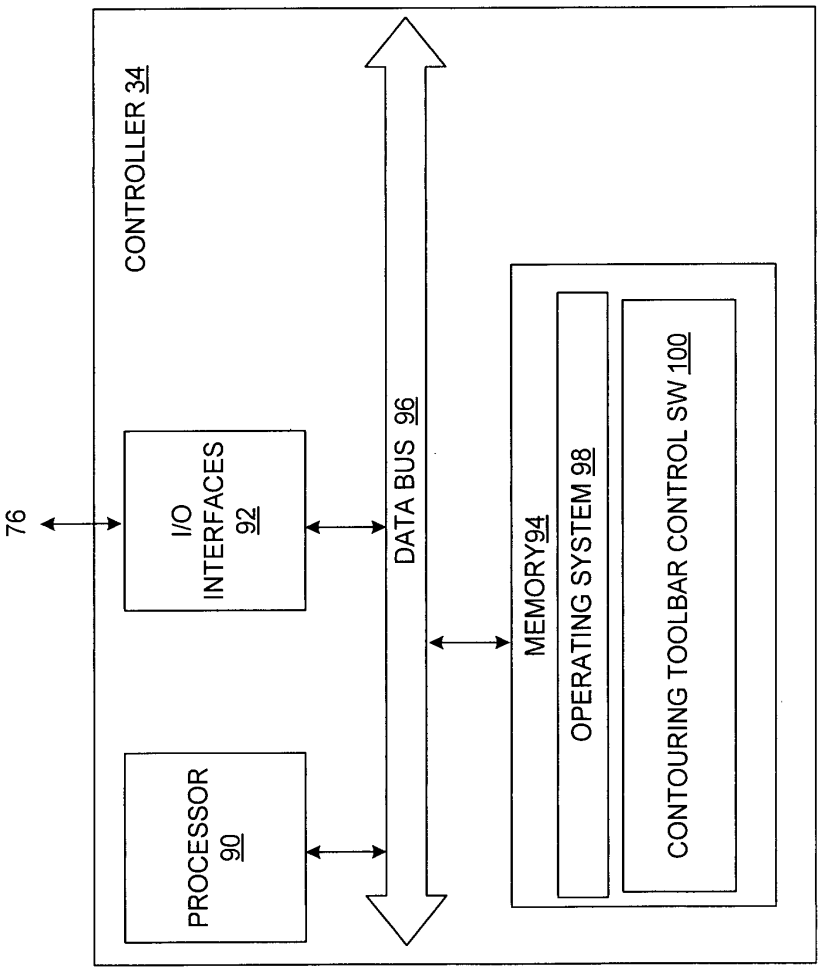

CONTROLLER 34
76
I/O INTERFACES 92
DATA BUS 96
PROCESSOR 90
MEMORY 94
OPERATING SYSTEM 98
CONTOURING TOOLBAR CONTROL SW 100

FIG. 5B

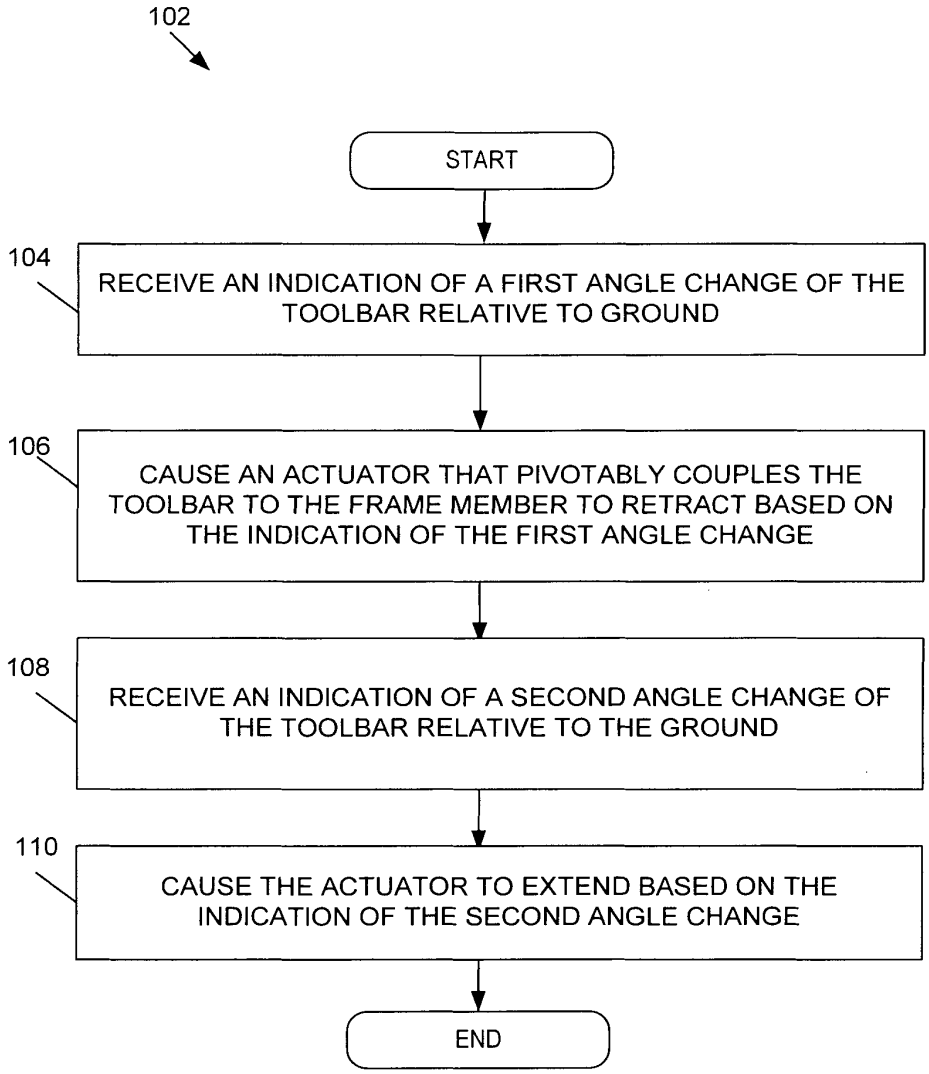

102
START
104
RECEIVE AN INDICATION OF A FIRST ANGLE CHANGE OF THE TOOLBAR RELATIVE TO GROUND
106
CAUSE AN ACTUATOR THAT PIVOTABLY COUPLES THE TOOLBAR TO THE FRAME MEMBER TO RETRACT BASED ON THE INDICATION OF THE FIRST ANGLE CHANGE
108
RECEIVE AN INDICATION OF A SECOND ANGLE CHANGE OF THE TOOLBAR RELATIVE TO THE GROUND
110
CAUSE THE ACTUATOR TO EXTEND BASED ON THE INDICATION OF THE SECOND ANGLE CHANGE
END

FIG. 6

UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/470,472	06/17/2019		1580	US16/40/WO/US-2	20	3

CONFIRMATION NO. 1653

FILING RECEIPT

88988
AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston, KS 67062

OC000000113178303

Date Mailed: 12/10/2019

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Benjamin Anson Fanshier, Hesston, KS;
Rex Schertz, Hesston, KS;

Applicant(s)

AGCO Corporation, Duluth, GA;

Power of Attorney: The patent practitioners associated with Customer Number 88988

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/IB2017/001298 10/26/2017
which claims benefit of 62/435,118 12/16/2016

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 12/07/2019

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/470,472**

Projected Publication Date: 03/19/2020

Non-Publication Request: No

Early Publication Request: No
Title

IMPLEMENT CONTOURING TOOLBAR

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
AGCO - Exhibit No. 2005
IPR2024-001459
Page 315

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

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The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET

Substitute for Form PTO-1360
(For use with Form PTO/SB/06)

Application Number	Filing Date
16470472	

Applicant(s) Benjamin Fanshier

* May be used for additional claims or amendments

CLAIMS	AS FILED		AFTER FIRST AMENDMENT		AFTER SECOND AMENDMENT	
	Indep	Depend	Indep	Depend	Indep	Depend
1	1		1			
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Total Indep	3		3		0	
Total Depend	17	↵	17	↵	0	↵
Total Claims	20		20		0	

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	Indep	Depend	Indep	Depend	Indep	Depend
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/470,472

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	300
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	520
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	760
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*			OR	x 100 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*				x 460 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1580

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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U.S. APPLICATION NO.	FIRST NAMED INVENTOR	ATTY. DOCKET NO.
16/470,472	Benjamin Anson Fanshier	US16/40/WO/US-2

88988
AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston, KS 67062

INTERNATIONAL APPLICATION NO.	
PCT/IB2017/001298	
I.A. FILING DATE	PRIORITY DATE
10/26/2017	12/16/2016

CONFIRMATION NO. 1653
371 ACCEPTANCE LETTER

OC000000113178304

Date Mailed: 12/10/2019

NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office, in its capacity as a Designated / Elected Office (37 CFR 1.495), has ACCEPTED the above identified international application for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above. A Filing Receipt will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE "FILING DATE or 371(c) DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 (c)(1) and (c)(2) REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN BELOW.** The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363)

06/17/2019
DATE OF RECEIPT OF 35 U.S.C.
371(c)(1) and (c)(2) REQUIREMENTS

The following items have been received:

- Copy of the International Application filed on 06/17/2019
- Copy of the International Search Report filed on 06/17/2019
- Preliminary Amendments filed on 06/17/2019
- Information Disclosure Statements filed on 06/17/2019
- Inventor's Oath or Declaration filed on 06/17/2019
- U.S. Basic National Fees filed on 06/17/2019
- Assignment filed on 06/17/2019
- Authorize Access to Search Results filed on 06/17/2019
- Priority Documents filed on 06/17/2019
- Power of Attorney filed on 06/18/2019
- Authorization to Permit Access filed on 06/17/2019
- Application Data Sheet (37 CFR 1.76) filed on 06/17/2019

FORM PCT/DO/EO/903 (371 Acceptance Notice)

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

CHARITTA S FLETCHER

Telephone: (571) 272-3926

FORM PCT/DO/EO/903 (371 Acceptance Notice)

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
AGCO - Exhibit No. 2005
IPR2024-001459
Page 320

To: patents@agcocorp.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 88988

Dec 10, 2019 03:35:54 AM

Dear PAIR Customer:

AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston, KS 67062
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 88988 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:
The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
16470472	APP.FILE.REC	12/10/2019	US16/40/WO/US-2
	M903	12/10/2019	US16/40/WO/US-2

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor (First): Benjamin Anson FANSHIER | Customer No.: 88988

Docket No.: US16/40/WO/US-2 | Application: 16/470,472

Filed: February 19, 2020

Title: **IMPLEMENT CONTOURING TOOLBAR**

Commissioner For Patents
P.O. Box 1450
Alexandria, VA 22313-1450

SECOND PRELIMINARY AMENDMENT

Dear Sir:

Prior to examining the above-identified application, please make the following amendments as shown in:

Amendments to the Claims are reflected in the listing of claims, which begins on page 2 of this paper.

Remarks appear on page 7 of this Paper.

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Currently Amended) A system, comprising:

[[a]] an elongate frame member;

[[a]] an elongate toolbar coupled to the frame member via a hinged joint, the toolbar oriented parallel to~~, and rearward of,~~ the frame member;

a ~~row unit~~ plurality of row units coupled to the toolbar;

a first sensor ~~coupled to the toolbar, the first sensor~~ configured to sense a position of the toolbar relative to ground; and

an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar relative to the frame member based on a sensed position of the toolbar.

2. (Canceled)

3. (Currently Amended) The system of claim 1, further comprising a second sensor ~~coupled to the frame member, the second sensor~~ configured to sense an angle of the toolbar relative to the frame member.

4. (Currently Amended) The system of claim 3, further comprising a ~~controller, the~~ controller configured to receive first and second signals from the first and second sensors and cause actuation of the actuator based on the first and second signals.

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5. (Original) The system of claim 4, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

6. (Original) The system of claim 5, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

7. (Original) The system of claim 4, wherein the controller is further configured to cause adjustment of a rate of rotation based on the first signals from the first sensor.

8. (Previously Presented) The system of claim 1, further comprising a controller, the controller configured to receive a signal from the first sensor and cause actuation of the actuator based on the signal.

9. (Original) The system of claim 8, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

10. (Original) The system of claim 9, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

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11. (Original) The system of claim 8, wherein the controller is further configured to cause adjustment of a rate of rotation based on the signal from the first sensor.

12. (Original) The system of claim 1, wherein the sensed position is relative to a field surface, further comprising one or more electromagnetic sensors coupled to the frame member, the toolbar, or a combination of the frame member and the toolbar, the one or more electromagnetic sensors configured to sense an absolute elevation or change in elevation between the field surface and the toolbar or a combination of both the frame member and the toolbar.

13. (Currently Amended) The system of claim 12, further comprising a ~~controller, the~~ controller configured to receive one or more signals from the one or more electromagnetic sensors and cause actuation of the actuator based on the one or more signals.

14. (Original) The system of claim 13, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

15. (Original) The system of claim 14, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

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16. (Original) The system of claim 13, wherein the controller is further configured to cause adjustment of a rate of rotation based on the one or more signals from the one or more electromagnetic sensors.

17. (Original) The system of claim 12, wherein the one or more electromagnetic sensors comprise ultrasonic, lidar, or radar sensors.

18. (Original) The system of claim 1, wherein the actuator is configured to rotate the toolbar throughout an obtuse angle range.

19. (Currently Amended) A control system for an implement comprising a frame member and a toolbar coupled to the frame member ~~rearward of and~~ parallel to the frame member via a hinged joint, wherein a plurality of row units are secured to the ~~toolbar are plural row units,~~ toolbar, the control system comprising:

a controller;

at least one sensor configured to sense a position of the toolbar relative to ground; and

an actuator coupled between the frame member and the toolbar, wherein the controller is configured to receive at least one signal from the at least one sensor indicating the position of the toolbar relative to the ground and cause the actuator to rotate the toolbar based on the sensed position of the toolbar.

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20. (Currently Amended) A computer-implemented method for an implement that comprises a toolbar that has a plurality of row units secured thereto, the method for adjusting a rotation of the toolbar based on a contour of a field on which the implement traverses, the method comprising:

at a controller:

receiving an indication of a first angle change of the toolbar relative to ground;

causing an actuator that pivotably couples the toolbar to the frame member to retract based on the indication of the first angle change;

receiving an indication of a second angle change of the toolbar relative to the ground; and

causing the actuator to extend based on the indication of the second angle change.

21. (Previously Presented) The system of claim 1, further comprising at least one wheel coupled to the frame member and at least partially supporting the frame member relative to the ground.

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REMARKS

Please enter the above claim amendments prior to examination of the application. By this paper, claims 1, 3, 4, 13, 19, and 20 are amended. Upon entry of this amendment, claims 1 and 3-21 will be pending. No new matter has been added.

CONCLUSION

No additional fees are believed due but the Commissioner is hereby authorized to charge any additional fees which may be required, or to credit any overpayment to Deposit Account No. 010442.

Should the Examiner determine that anything else is desirable to place this application in an even better form for allowance, the Examiner is respectfully requested to contact the undersigned by telephone.

Respectfully submitted:

By: /Nathan E. Whitlock/

Nathan E. Whitlock
Reg. No.: 65,744
Phone: (620) 327-6993

SEND CORRESPONDENCE TO:
AGCO Corporation - Legal
420 W Lincoln Blvd
Hesston, KS 67062
February 21, 2020

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
AGCO - Exhibit No. 2005
IPR2024-001459
Page 328

Electronic Acknowledgement Receipt

EFS ID:	38651567
Application Number:	16470472
International Application Number:	
Confirmation Number:	1653
Title of Invention:	IMPLEMENT CONTOURING TOOLBAR
First Named Inventor/Applicant Name:	Benjamin Anson Fanshier
Customer Number:	88988
Filer:	Linda Blankenship
Filer Authorized By:	
Attorney Docket Number:	US16/40/WO/US-2
Receipt Date:	21-FEB-2020
Filing Date:	17-JUN-2019
Time Stamp:	10:19:12
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		US1640WOUS-2_FiledSecondPreliminaryAmdt.pdf	472687 48482a61534521395 7a700f868ec5a67248b027b	yes	7

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Preliminary Amendment	1	1
	Claims	2	6
	Applicant Arguments/Remarks Made in an Amendment	7	7
Warnings:			
Information:			
	Total Files Size (in bytes):	472687	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/470,472	Filing Date 06/17/2019	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

AMENDMENT	02/21/2020	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $460 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	SLIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/TONGELINA C TUBBS/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/470,472	06/17/2019	Benjamin Anson Fanshier	US16/40/WO/US-2

CONFIRMATION NO. 1653

88988
AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston, KS 67062

PUBLICATION NOTICE

OC000000115557251

Title:IMPLEMENT CONTOURING TOOLBAR

Publication No.US-2020-0084951-A1
Publication Date:03/19/2020

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Public Records Division. The Public Records Division can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Public Records Division, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently https://portal.uspto.gov/pair/PublicPair. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

To: patents@agcocorp.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 88988

Mar 20, 2020 09:35:45 AM

Dear PAIR Customer:

AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston, KS 67062
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 88988 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

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The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
16470472	NTC.PUB	03/19/2020	US16/40/WO/US-2

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

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Thank you for prompt attention to this notice,

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/470,472	06/17/2019	Benjamin Anson Fanshier	US16/40/WO/US-2	1653

88988 7590 06/24/2021

AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston, KS 67062

EXAMINER	
LUTZ, JESSICA H	

ART UNIT	PAPER NUMBER
3671	

NOTIFICATION DATE	DELIVERY MODE
06/24/2021	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patents@agcocorp.com

Office Action Summary	Application No. 16/470,472	Applicant(s) Fanshier et al.	
	Examiner JESSICA H LUTZ	Art Unit 3671	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 2/21/20.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1 and 3-21 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1 and 3-21 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on 6/17/19 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Claim Rejections - 35 USC § 102

2. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention.

4. Claim(s) 1, 8-16, 18-21 is/are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Casper et al. (US 8,573,319).

Regarding claims 1, 19, and 20, Casper teaches a system, comprising: an elongate frame member (fig. 1, frame above wheels); an elongate toolbar (85) coupled to the frame member via a hinged joint (fig. 7), the toolbar oriented parallel to the frame member(fig. 1); plurality of row units (295) coupled to the toolbar; a first sensor (130) configured to sense a position of the toolbar relative to ground; and an actuator coupled between the frame member and the toolbar, the actuator (300) configured to rotate the toolbar relative to the frame member based on a sensed position of the toolbar (control unit 140).

8. (Previously Presented) The system of claim 1, further comprising a controller (140), the controller configured to receive a signal from the first sensor and cause actuation of the actuator based on the signal (1:53-59).

9. The system of claim 8, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component (5: 34-39 electric control 50 and 145).

10. The system of claim 9, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component (5: 34-39 electric control component 50 and 145).

11. The system of claim 8, wherein the controller is further configured to cause adjustment of a rate of rotation based on the signal from the first sensor (5:21-54).

18. The system of claim 1, wherein the actuator is configured to rotate the toolbar throughout an obtuse angle range (fig. 1).

21. The system of claim 1, further comprising at least one wheel (40) coupled to the frame member and at least partially supporting the frame member relative to the ground.

12. The system of claim 1, wherein the sensed position is relative to a field surface (130 and fig. 1), further comprising one or more electromagnetic sensors coupled to the frame member, the toolbar, or a combination of the frame member and the toolbar, the one or more

electromagnetic sensors configured to sense an absolute elevation or change in elevation between the field surface and the toolbar or a combination of both the frame member and the toolbar (4:56-63) .

13. The system of claim 12, further comprising a controller (140), the controller configured to receive one or more signals from the one or more electromagnetic sensors and cause actuation of the actuator based on the one or more signals.

14. The system of claim 13, further comprising a control component (component 50 and signal 145) that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

15. The system of claim 14, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component (50, 145).

16. The system of claim 13, wherein the controller is further configured to cause adjustment of a rate of rotation based on the one or more signals from the one or more electromagnetic sensors (5:21-34).

Claim Rejections - 35 USC § 103

5. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory

basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

6. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 3-7 is/are rejected under 35 U.S.C. 103 as being unpatentable over Casper as applied to claims 1 in view of Gutknecht (US 2019/0021211).

Regarding claim 3, Casper teaches the system of claim 1, further comprising a second sensor (137), but fails to teach further comprising a second sensor configured to sense an angle of the toolbar relative to the frame member. However, Gutknecht teaches a similar system with a sensor (70) to measure the angle of a frame to a toolbar. It would have been obvious to one with ordinary skill in the art, before the effective filing date of the claimed invention, to include a sensor to measure the angle of the toolbar relative to the frame in order to better measure and adjust for uneven terrain as taught beneficial by Gutknecht [4].

4. The system of claim 3, further comprising a controller (140) configured to receive first and second signals from the first and second sensors and cause actuation of the actuator based on the first and second signals (as modified and 1:53-59).

5. The system of claim 4, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component (5: 34-39 electric control component 50 and 145).

6. The system of claim 5, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component (5: 34-39 electric control component 50 and 145).

7. The system of claim 4, wherein the controller is further configured to cause adjustment of a rate of rotation based on the first signals from the first sensor (5:21-54).

8. Claim 17 is/are rejected under 35 U.S.C. 103 as being unpatentable over Casper as applied to claim 12.

Regarding claim 17, Casper teaches the system of claim 12, but fails to teach wherein the one or more electromagnetic sensors comprise ultrasonic, lidar, or radar sensors. However, examiner takes official notice Hall Effect rotational sensor and ultrasonic sensors are both equivalents in the art for determining distance. It would have been obvious to one with ordinary skill in the art, before the effective filing date of the claimed invention, to substitute an ultrasonic sensor for the Hall effect sensor of Casper as an well-known alternative to measure the distance of the toolbar to the ground.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JESSICA H LUTZ whose telephone number is (571)270-7308. The examiner can normally be reached on M-F 10:30-5 ET.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Will can be reached on 571-272-6998. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see https://ppair-my.uspto.gov/pair/PrivatePair. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JESSICA H LUTZ/
Primary Examiner, Art Unit 3671

Notice of References Cited	Application/Control No. 16/470,472	Applicant(s)/Patent Under Reexamination Fanshier et al.	
	Examiner JESSICA H LUTZ	Art Unit 3671	Page 1 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20190373801-A1	12-2019	Schoeny; Christopher	A01B79/005	1/1
*	B	US-20190021211-A1	01-2019	Gutknecht; Brett	A01B59/042	1/1
*	C	US-20150289438-A1	10-2015	Sauder; Derek	A01B79/005	701/50
*	D	US-20130112124-A1	05-2013	Bergen; Gary	A01C7/205	111/151
*	E	US-20130112123-A1	05-2013	Turko; Leo V.	A01B35/16	111/151
*	F	US-10939604-B2	03-2021	Sporrer; Adam D.	A01B76/00	1/1
*	G	US-10561052-B2	02-2020	Barrick; Christopher	A01B79/005	1/1
*	H	US-10506756-B2	12-2019	Fanshier; Benjamin Anson	A01B63/32	1/1
*	I	US-9930823-B2	04-2018	Jagow; Scot	A01B63/145	1/1
*	J	US-9253937-B2	02-2016	Horsch; Michael	A01B73/048	1/1
*	K	US-8857530-B2	10-2014	Henry; Jim	A01B63/114	172/4
*	L	US-8573319-B1	11-2013	Casper; Robert T.	A01B63/114	172/4
*	M	US-6378619-B2	04-2002	Mayerle; Dean J.	A01B63/11	172/2

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
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	P					
	Q					
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	S					
	T					

NON-PATENT DOCUMENTS

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Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
AGCO - Exhibit No. 2005
IPR2024-001459
Page 342

Notice of References Cited	Application/Control No. 16/470,472	Applicant(s)/Patent Under Reexamination Fanshier et al.	
	Examiner JESSICA H LUTZ	Art Unit 3671	Page 2 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-5653292-A	08-1997	Ptacek; Timothy J.	A01B63/114	172/239
*	B	US-5499683-A	03-1996	Bassett; James H.	A01B63/114	172/239
*	C	US-5479992-A	01-1996	Bassett; James H.	A01B63/114	111/134
	D					
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	F					
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AGCO - Exhibit No. 2005
IPR2024-001459
Page 343

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/470,472	Fanshier et al.
	Examiner	Art Unit
	JESSICA H LUTZ	3671

CPC - Searched*		
Symbol	Date	Examiner
a01b63/114,102,1112,28	06/19/2021	jl

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
EAST text (see attached)	06/19/2021	jl
inventor name search	06/19/2021	jl

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/JESSICA H LUTZ/ Primary Examiner, Art Unit 3671	

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
AGCO - Exhibit No. 2005
IPR2024-001459
Page 344

PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	2019-06-17
First Named Inventor	Benjamin Anson FANSHIER
Art Unit	
Examiner Name	
Attorney Docket Number	US16/40/WO/US-2

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5511623	A	1996-04-30	FRASIER, MICHAEL E	
	2	4825958	A	1989-05-02	KELDERMAN, Gary L.	
	3	6112827	A	2000-09-05	REIBER PHILLIP A	see WO ISR
	4	6076611	A	2000-06-20	ROZENDAAL et al	see GB SR

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	1	20020017090	A1	2002-02-14	HOCKENBECK, LEO SCHULZE	
	2	20140196996	A1	2014-07-17	ITO TATSUO et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.H.L/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	2019-06-17
	First Named Inventor	Benjamin Anson FANSHIER
	Art Unit	
	Examiner Name	
	Attorney Docket Number	US16/40/WO/US-2

	3	20110284252	A1	2011-11-24	FRIGGSTAD, et al.	see GB SR
	4	20150156955	A1	2015-06-11	SUDBRINK, et al.	see GB SR
	5	20140069670	A1	2014-03-13	FRIESEN, et al.	
	6	20120298388	A1	2012-11-29	BAUER, Mark A.	
	7	20020017389	A1	2002-02-14	MOSER et al	
	8	20150230391	A1	2015-08-20	HOUCK, SHANE	see WO ISR
	9	20080308020	A1	2008-12-18	RYDER et al;	see GB SR
	10	20110120357	A1	2011-05-26	SCHILLING et al;	see GB SR
	11	20110315410	A1	2011-12-29	KINZENBAW	see GB SR

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	First Named Inventor	Benjamin Anson FANSHIER
	Art Unit	
	Examiner Name	
	Attorney Docket Number	US16/40/WO/US-2

	1	1859670	EP	A1	2007-11-28	MAASLAND NV		☒
	2	2014/066654	WO	A1	2014-05-01	Precision Planting LLC	see WO ISR	☒
	3	2 524 587	EP	A1	2012-11-21	DEERE & CO	see WO ISR	☒
	4	2010201330	AU	A1	2011-03-24	AF GASON	see GB SR	☒
	5	2003/096785	WO	A1	2003-11-27	LEMPRIERE	see GB SR	☒

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	1	EUROPEAN PATENT OFFICE. International Search Report for International Application No. PCT/IB2017/001298, mail date 25 JAN 2018.	☒
	2	UK INTELLECTUAL PROPERTY OFFICE, Search report for related UK Application No. GB 1700585. I , dated 17 JULY 2017.	☒

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Examiner Signature	/JESSICA H LUTZ/	Date Considered	06/18/2021

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	First Named Inventor	Benjamin Anson FANSHIER
	Art Unit	
	Examiner Name	
	Attorney Docket Number	US16/40/WO/US-2

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	2019-06-17
	First Named Inventor	Benjamin Anson FANSHIER
	Art Unit	
	Examiner Name	
	Attorney Docket Number	US16/40/WO/US-2

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Linda Blankenship/	Date (YYYY-MM-DD)	2019-06-17
Name/Print	Linda Blankenship	Registration Number	75274

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

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8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

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AGCO - Exhibit No. 2005
IPR2024-001459

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	0	"2015289438"	US-PGPUB; USPAT	OR	OFF	2021/06/18 19:50
L4	7	sauder.inv. and depth near sensing	US-PGPUB; USPAT	OR	OFF	2021/06/18 19:52
L5	1,078	(ground soil) with sens$3 with angle and (down near pressure actuator) and (frame tool toolbar)	US-PGPUB; USPAT	OR	OFF	2021/06/18 19:56
L7	10	((ground soil) and sens$3 and angle and (cylinder actuator)and toolbar).clm.	US-PGPUB; USPAT	OR	OFF	2021/06/18 19:58
L8	10	((ground soil) and sens$3 and angle and (cylinder actuator)and tool adj bar).clm.	US-PGPUB; USPAT	OR	OFF	2021/06/18 19:58
L9	1	(14/623758).APP.	USPAT; USOCR	OR	OFF	2021/06/18 20:04
L10	43	("20090301743" | "20120060731" | "20130032363" | "20130192186" | "20140048296" | "20140060862" | "20150230391" | "3673970" | "3749035" | "4044697" | "4176721" | "4353423" | "4377979" | "4422511" | "4444271" | "4506609" | "5479992" | "5499683" | "5590721" | "5640914" | "5653292" | "6085846" | "6971452" | "8201637" | "8235130" | "8448717" | "8534373" | "8573319" | "8577561" | "8601961" | "8657023" | "8857530" | "9232687").PN. OR ("9554504").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/06/18 20:04
L11	475	a01b63/114,102,1112,28.cpc.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/06/18 20:31
L12	1	(12/783655).APP.	USPAT; USOCR	OR	OFF	2021/06/18 20:33
L13	46	("20070163791" | "20080093093" | "20100025056" | "2595461" | "2605686" | "2715286" | "2918979" | "2958383" | "3752092" | "4158391" | "4519460" | "4763915" | "4821806" | "4867247" | "5042589" | "5234060" | "5669452" | "5868207" | "6305478" | "6378619" | "6698523" | "7478682" | "7581597").PN. OR ("8567517").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/06/18 20:33

L14	18	("20020017090" | "20020017389" | "20080093093" | "20080308020" | "20110120357" | "20110284252" | "20110315410" | "20120298388" | "20140069670" | "20140196996" | "20150156955" | "20150230391" | "4825958" | "5511623" | "6076611" | "6112827" | "8567517" | "8657026").PN. OR ("10506756").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/06/18 20:34
S1	26	((("FANSHIER") near3 ("Benjamin")) OR (("SCHERTZ") near3 ("Rex"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2021/06/18 10:07
S2	15	("20020017090" | "20020017389" | "20080308020" | "20110120357" | "20110284252" | "20110315410" | "20120298388" | "20140069670" | "20140196996" | "20150156955" | "20150230391" | "4825958" | "5511623" | "6076611" | "6112827").PN.	US-PGPUB; USPAT	OR	OFF	2021/06/18 10:09

EAST Search History (Interference)

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Application	Document	Mailroom Date	Attorney Docket No.
16470472	CTNF	06/24/2021	US16/40/WO/US-2
	892	06/24/2021	US16/40/WO/US-2
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PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

PATENT

UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor (First):	FANSHIER, Benjamin Anson	Art Unit:	3671
Application No.:	16/470,472	Examiner:	Lutz, Jessica H.
Filed:	June 17, 2019	Docket No.:	US16/40/WO/US-2
Confirmation No.:	1653		

Title: **IMPLEMENT CONTOURING TOOLBAR**

Electronically Filed July 29, 2021

RESPONSE TO OFFICE ACTION

Commissioner for Patents
Mail Stop – Amendment
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

In response to the Office Action dated June 24, 2021:

A Listing of the Claims begins on page 6 of this paper;

Remarks begin on page 7 of this paper.

LISTING OF THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Previously Presented) A system, comprising:

an elongate frame member;

an elongate toolbar coupled to the frame member via a hinged joint, the toolbar oriented parallel to the frame member;

a plurality of row units coupled to the toolbar;

a first sensor configured to sense a position of the toolbar relative to ground; and

an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar relative to the frame member based on a sensed position of the toolbar.

2. (Canceled)

3. (Previously Presented) The system of claim 1, further comprising a second sensor configured to sense an angle of the toolbar relative to the frame member.

4. (Previously Presented) The system of claim 3, further comprising a controller configured to receive first and second signals from the first and second sensors and cause actuation of the actuator based on the first and second signals.

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5. (Original) The system of claim 4, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

6. (Original) The system of claim 5, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

7. (Original) The system of claim 4, wherein the controller is further configured to cause adjustment of a rate of rotation based on the first signals from the first sensor.

8. (Previously Presented) The system of claim 1, further comprising a controller, the controller configured to receive a signal from the first sensor and cause actuation of the actuator based on the signal.

9. (Original) The system of claim 8, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

10. (Original) The system of claim 9, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

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11. (Original) The system of claim 8, wherein the controller is further configured to cause adjustment of a rate of rotation based on the signal from the first sensor.

12. (Original) The system of claim 1, wherein the sensed position is relative to a field surface, further comprising one or more electromagnetic sensors coupled to the frame member, the toolbar, or a combination of the frame member and the toolbar, the one or more electromagnetic sensors configured to sense an absolute elevation or change in elevation between the field surface and the toolbar or a combination of both the frame member and the toolbar.

13. (Previously Presented) The system of claim 12, further comprising a controller configured to receive one or more signals from the one or more electromagnetic sensors and cause actuation of the actuator based on the one or more signals.

14. (Original) The system of claim 13, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

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15. (Original) The system of claim 14, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

16. (Original) The system of claim 13, wherein the controller is further configured to cause adjustment of a rate of rotation based on the one or more signals from the one or more electromagnetic sensors.

17. (Original) The system of claim 12, wherein the one or more electromagnetic sensors comprise ultrasonic, lidar, or radar sensors.

18. (Original) The system of claim 1, wherein the actuator is configured to rotate the toolbar throughout an obtuse angle range.

19. (Previously Presented) A control system for an implement comprising a frame member and a toolbar coupled to the frame member parallel to the frame member via a hinged joint, wherein a plurality of row units are secured to the toolbar, the control system comprising:

a controller;

at least one sensor configured to sense a position of the toolbar relative to ground; and

an actuator coupled between the frame member and the toolbar, wherein the controller is configured to receive at least one signal from the at least one sensor indicating

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the position of the toolbar relative to the ground and cause the actuator to rotate the toolbar based on the sensed position of the toolbar.

20. (Previously Presented) A computer-implemented method for an implement that comprises a toolbar that has a plurality of row units secured thereto, the method for adjusting a rotation of the toolbar based on a contour of a field on which the implement traverses, the method comprising:

at a controller:

receiving an indication of a first angle change of the toolbar relative to ground;

causing an actuator that pivotably couples the toolbar to the frame member to retract based on the indication of the first angle change;

receiving an indication of a second angle change of the toolbar relative to the ground; and

causing the actuator to extend based on the indication of the second angle change.

21. (Previously Presented) The system of claim 1, further comprising at least one wheel coupled to the frame member and at least partially supporting the frame member relative to the ground.

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REMARKS

The Office Action dated June 24, 2021, has been received and reviewed. Claims 1 and 3-21 are pending in the application. Claims 1 and 3-21 stand rejected.

Applicant respectfully requests reconsideration of the application.

Claim Rejections under 35 U.S.C. § 102

Claims 1, 8-16, and 18-21 stand rejected under 35 U.S.C. § 102(a)(1) as anticipated by U.S. Patent 8,573,319 ("Casper"). Applicant respectfully traverses this rejection.

The 35 U.S.C. § 102 rejection of claims 1, 8-16, 18, and 21 cannot be maintained because Casper does not expressly or inherently disclose "an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar relative to the frame member based on a sensed position of the toolbar," as recited in claim 1.

Casper discloses a control system for an agricultural implement that includes a first frame section 20, a second frame section 65, and a third frame section 85 carrying ground-engaging tools 90. *Casper*, col. 3, line 21 through col. 4, line 13. A position sensor is 130 configured to measure the operating depth of the ground-engaging tool 90. *Casper*, col. 4, line 64 through col. 5, line 2. The third frame section 85 is pivotally coupled to the first frame section 20 by a parallel linkage such that its height is controlled by an actuator 300 (parallel linkage not numbered, but shown best in FIG. 7).

The Office relies on the actuator 300 as being configured to rotate the toolbar 85. However, because the toolbar 85 is connected by a parallel linkage, the toolbar 85 does not rotate relative to the second frame section 65. The toolbar 85 instead may be raised and lowered relative to the second frame section 65.

Therefore, Casper does not disclose "an actuator . . . configured to rotate the toolbar relative to the frame member." Furthermore, an actuator as claimed is not inherent in the structure disclosed in Casper.

Therefore, claim 1 is not anticipated by the disclosure of Casper. Claims 8-16, 18, and 21 are not anticipated at least because they depend from claim 1.

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Claim 18 is further allowable because Casper does not disclose that "the actuator is configured to rotate the toolbar throughout an obtuse angle range." The Office relies on FIG. 1 of as disclosing this element. However, there appears to be no such disclosure in FIG. 1.

Claims 19 and 20 are not anticipated for similar reasons as claim 1. The 35 U.S.C. § 102 rejection of claim 19 cannot be maintained because Casper does not expressly or inherently disclose a control system having "an actuator coupled between the frame member and the toolbar, wherein the controller is configured to receive at least one signal from the at least one sensor indicating the position of the toolbar relative to the ground and cause the actuator to rotate the toolbar based on the sensed position of the toolbar," as recited in claim 19.

The 35 U.S.C. § 102 rejection of claim 20 cannot be maintained because Casper does not expressly or inherently disclose "receiving an indication of a first angle change of the toolbar relative to ground; causing an actuator that pivotably couples the toolbar to the frame member to retract based on the indication of the first angle change; receiving an indication of a second angle change of the toolbar relative to the ground; and causing the actuator to extend based on the indication of the second angle change," as recited in claim 20.

Applicant respectfully requests that the rejection of claims 1, 8-16, and 18-21 under 35 U.S.C. § 102(a)(1) based on Casper be withdrawn.

Claim Rejections under 35 U.S.C. § 103

Claims 3-7 stand rejected under 35 U.S.C. § 103 as being unpatentable over Casper in view of U.S. Patent Publication 2019/0021211 ("Gutknecht"). Applicant respectfully traverses this rejection.

The 35 U.S.C. § 103 rejection of claims 3-7 cannot be maintained because Casper in view of Gutknecht does not teach, suggest, or otherwise render obvious "an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar relative to the frame member based on a sensed position of the toolbar," as recited in claim 1, from which these claims depend.

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The teachings of Casper are summarized above with respect to 35 U.S.C. § 102. In particular, there is no teaching in Casper of an actuator . . . configured to rotate the toolbar relative to the frame member.

The Office relies on Gutknecht as teaching a sensor 70 for measuring the angle of a parallel linkage 60. *Office Action*, p. 5. However, Gutknecht does not teach "an actuator . . . configured to rotate the toolbar relative to the frame member." Therefore, Gutknecht does not cure the deficiency of Casper with respect to claim 1.

Therefore, claim 1 is allowable. Claims 3-7 are each allowable at least because each depends from claim 1. Applicant respectfully requests that the rejection of claims 3-7 under 35 U.S.C. § 103 be withdrawn.

Claim 17 stands rejected under 35 U.S.C. § 103 as being unpatentable over Casper alone. Applicant respectfully traverses this rejection.

The 35 U.S.C. § 103 rejection of claim 17 cannot be maintained because as discussed above, Casper does not teach, suggest, or otherwise render obvious "an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar relative to the frame member based on a sensed position of the toolbar," as recited in claim 1, from which claim 17 depends.

Applicant respectfully requests that the rejection of claim 17 under 35 U.S.C. § 103 be withdrawn.

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CONCLUSION

Claims 1 and 3-21 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain that might be resolved by a telephone conference, the Examiner is respectfully invited to contact Applicant's undersigned attorney.

Respectfully submitted:

By: /Nathan E. Whitlock/

Nathan E. Whitlock
Reg. No.: 65,744
AGCO Corporation
Patent Department
420 W Lincoln Blvd
Hesston, KS 67062
Phone: (620) 327-6993

July 29, 2021

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Electronic Acknowledgement Receipt

EFS ID:	43376054
Application Number:	16470472
International Application Number:	
Confirmation Number:	1653
Title of Invention:	IMPLEMENT CONTOURING TOOLBAR
First Named Inventor/Applicant Name:	Benjamin Anson Fanshier
Customer Number:	88988
Filer:	Linda Blankenship
Filer Authorized By:	
Attorney Docket Number:	US16/40/WO/US-2
Receipt Date:	29-JUL-2021
Filing Date:	17-JUN-2019
Time Stamp:	12:04:38
Application Type:	U.S. National Stage under 35 USC 371

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		US1640WOUS-2_OA_response Filed.pdf	499777 f8cd6093c94842f039c5349c41c5618d1a277032	yes	10

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	6
	Applicant Arguments/Remarks Made in an Amendment	7	10
Warnings:			
Information:			
	Total Files Size (in bytes):	499777	

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/470,472	Filing Date 06/17/2019	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

	(Column 1)	(Column 2)			
FOR	NUMBER FILED	NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

AMENDMENT	07/29/2021	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	ADMIN
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/KREIGHTON LAMBERT SR/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/470,472	06/17/2019	Benjamin Anson Fanshier	US16/40/WO/US-2	1653

88988 7590 10/28/2021

AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston, KS 67062

EXAMINER
LUTZ, JESSICA H

ART UNIT	PAPER NUMBER
3671	

NOTIFICATION DATE	DELIVERY MODE
10/28/2021	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patents@agcocorp.com

Office Action Summary	Application No. 16/470,472	Applicant(s) Fanshier et al.	
	Examiner JESSICA H LUTZ	Art Unit 3671	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 7/29/21.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☑ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1 and 3-21 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1 and 3-21 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Response to Remarks filed 7/29/21

Claim Rejections - 35 USC § 102

1. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention.

3. Claim(s) 1, 8-16, 18-21 is/are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Casper et al. (US 8,573,319).

Regarding claims 1, 19, and 20, Casper teaches a system, comprising: an elongate frame member (fig. 1, frame above wheels); an elongate toolbar (85) coupled to the frame member via a hinged joint (fig. 7), the toolbar oriented parallel to the frame member(fig. 1); plurality of row units (295) coupled to the toolbar; a first sensor (130) configured to sense a position of the toolbar relative to ground; and an actuator coupled between the frame member and the toolbar, the actuator (300) configured to rotate the toolbar relative to the frame member based on a sensed position of the toolbar (control unit 140).

8. The system of claim 1, further comprising a controller (140), the controller configured to receive a signal from the first sensor and cause actuation of the actuator based on the signal (1:53-59).

9. The system of claim 8, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component (5: 34-39 electric control 50 and 145).

10. The system of claim 9, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component (5: 34-39 electric control component 50 and 145).

11. The system of claim 8, wherein the controller is further configured to cause adjustment of a rate of rotation based on the signal from the first sensor (5:21-54).

18. The system of claim 1, wherein the actuator is configured to rotate the toolbar throughout an obtuse angle range (fig. 1).

21. The system of claim 1, further comprising at least one wheel (40) coupled to the frame member and at least partially supporting the frame member relative to the ground.

12. The system of claim 1, wherein the sensed position is relative to a field surface (130 and fig. 1), further comprising one or more electromagnetic sensors coupled to the frame member, the toolbar, or a combination of the frame member and the toolbar, the one or more electromagnetic sensors configured to sense an absolute elevation or change in elevation between the field surface and the toolbar or a combination of both the frame member and the toolbar (4:56-63) .

13. The system of claim 12, further comprising a controller (140), the controller configured to receive one or more signals from the one or more electromagnetic sensors and cause actuation of the actuator based on the one or more signals.

14. The system of claim 13, further comprising a control component (component 50 and signal 145) that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

15. The system of claim 14, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component (50, 145).

16. The system of claim 13, wherein the controller is further configured to cause adjustment of a rate of rotation based on the one or more signals from the one or more electromagnetic sensors (5:21-34).

Claim Rejections - 35 USC § 103

4. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

5. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 3-7 is/are rejected under 35 U.S.C. 103 as being unpatentable over Casper as applied to claims 1 in view of Gutknecht (US 2019/0021211).

Regarding claim 3, Casper teaches the system of claim 1, further comprising a second sensor (137), but fails to teach further comprising a second sensor configured to sense an angle of the toolbar relative to the frame member. However, Gutknecht teaches a similar system with a sensor (70) to measure the angle of a frame to a toolbar. It would have been obvious to one with ordinary skill in the art, before the effective filing date of the claimed invention, to include a sensor to measure the angle of the toolbar relative to the frame in order to better measure and adjust for uneven terrain as taught beneficial by Gutknecht [4].

4. The system of claim 3, further comprising a controller (140) configured to receive first and second signals from the first and second sensors and cause actuation of the actuator based on the first and second signals (as modified and 1:53-59).

5. The system of claim 4, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component (5: 34-39 electric control component 50 and 145).

6. The system of claim 5, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component (5: 34-39 electric control component 50 and 145).

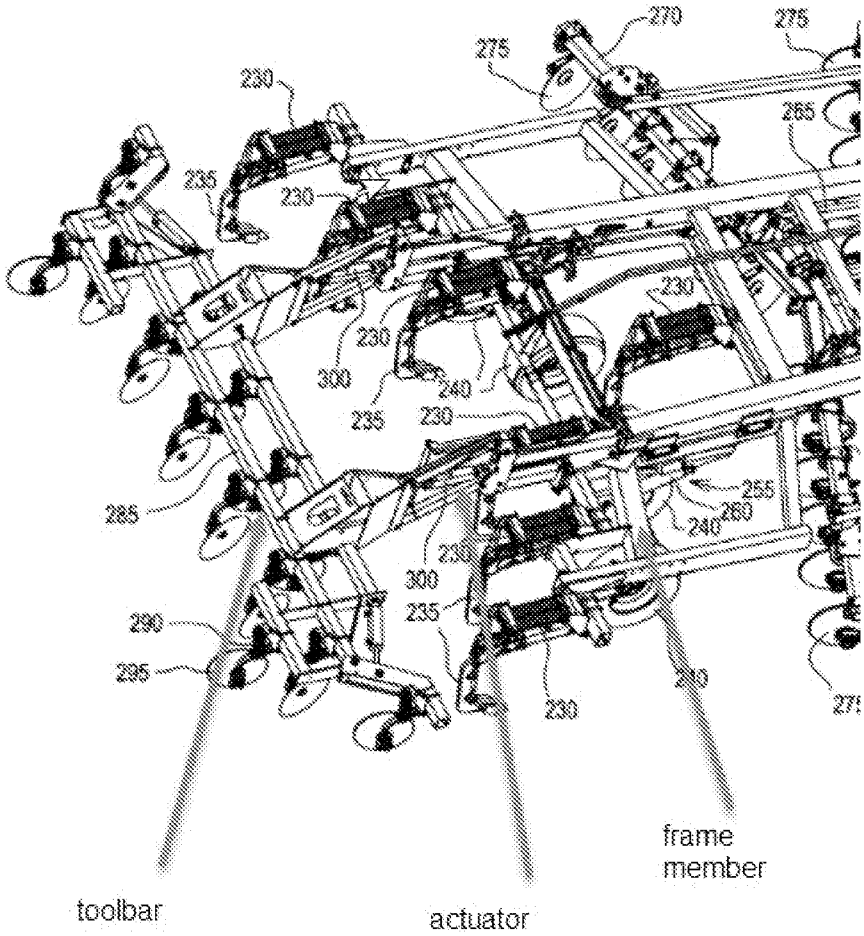
7. The system of claim 4, wherein the controller is further configured to cause adjustment of a rate of rotation based on the first signals from the first sensor (5:21-54).

7. Claim 17 is/are rejected under 35 U.S.C. 103 as being unpatentable over Casper as applied to claim 12.

Regarding claim 17, Casper teaches the system of claim 12, but fails to teach wherein the one or more electromagnetic sensors comprise ultrasonic, lidar, or radar sensors. However, examiner takes official notice Hall Effect rotational sensor and ultrasonic sensors are both equivalents in the art for determining distance. It would have been obvious to one with ordinary skill in the art, before the effective filing date of the claimed invention, to substitute an ultrasonic sensor for the Hall effect sensor of Casper as an well-known alternative to measure the distance of the toolbar to the ground.

Response to Arguments

8. Applicant's arguments filed 7/29/21 have been fully considered but they are not persuasive. Applicant argues the toolbar 85 of Casper is connected parallel to linkage, but does not rotate relative to the linkage, but is only raised and lowered. However, the hinge point of where actuator 300 is attached (see Image 1 below), provides rotation of toolbar 85 during actuation of 300. Therefore, the toolbar 85 does rotate relative to the frame (linkage) as shown in the movement of the pivot links in fig 1 to fig. 2, which have a pivot point relative to frame that allows the toolbar to be lifted.



9.

10. Image 1: annotated drawing of Casper fig. 10.

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH

shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JESSICA H LUTZ whose telephone number is (571)270-7308. The examiner can normally be reached on M-F 10:30-5 ET.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Will can be reached on 571-272-6998. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see https://ppair-my.uspto.gov/pair/PrivatePair. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JESSICA H LUTZ/
Primary Examiner, Art Unit 3671

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/470,472	Fanshier et al.
	Examiner	Art Unit
	JESSICA H LUTZ	3671

CPC - Searched*		
Symbol	Date	Examiner
a01b63/114,102,1112,28	06/19/2021	jl

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
EAST text (see attached)	06/19/2021	jl
inventor name search	06/19/2021	jl

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/JESSICA H LUTZ/ Primary Examiner, Art Unit 3671	

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
AGCO - Exhibit No. 2005
IPR2024-001459
Page 377

To: patents@agcocorp.com,,
From: PAIR_eOfficeAction@uspto.gov
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Oct 28, 2021 04:06:42 AM

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Application	Document	Mailroom Date	Attorney Docket No.
16470472	CTFR	10/28/2021	US16/40/WO/US-2

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UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

PATENT

UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor (First):	FANSHIER, Benjamin Anson	Art Unit:	3671
Application No.:	16/470,472	Examiner:	Lutz, Jessica H.
Filed:	June 17, 2019	Docket No.:	US16/40/WO/US-2
Confirmation No.:	1653		

Title: **IMPLEMENT CONTOURING TOOLBAR**

Electronically Filed December 20, 2021

RESPONSE TO FINAL OFFICE ACTION UNDER 37 CFR § 1.116

Commissioner for Patents
Mail Stop – Amendment
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

In response to the Final Office Action dated October 28, 2021:

A Listing of the Claims begins on page 2 of this paper;

Remarks begin on page 7 of this paper.

LISTING OF THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Previously Presented) A system, comprising:

an elongate frame member;

an elongate toolbar coupled to the frame member via a hinged joint, the toolbar oriented parallel to the frame member;

a plurality of row units coupled to the toolbar;

a first sensor configured to sense a position of the toolbar relative to ground; and

an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar relative to the frame member based on a sensed position of the toolbar.

2. (Canceled)

3. (Previously Presented) The system of claim 1, further comprising a second sensor configured to sense an angle of the toolbar relative to the frame member.

4. (Previously Presented) The system of claim 3, further comprising a controller configured to receive first and second signals from the first and second sensors and cause actuation of the actuator based on the first and second signals.

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5. (Original) The system of claim 4, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

6. (Original) The system of claim 5, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

7. (Original) The system of claim 4, wherein the controller is further configured to cause adjustment of a rate of rotation based on the first signals from the first sensor.

8. (Previously Presented) The system of claim 1, further comprising a controller, the controller configured to receive a signal from the first sensor and cause actuation of the actuator based on the signal.

9. (Original) The system of claim 8, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

10. (Original) The system of claim 9, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

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11. (Original) The system of claim 8, wherein the controller is further configured to cause adjustment of a rate of rotation based on the signal from the first sensor.

12. (Original) The system of claim 1, wherein the sensed position is relative to a field surface, further comprising one or more electromagnetic sensors coupled to the frame member, the toolbar, or a combination of the frame member and the toolbar, the one or more electromagnetic sensors configured to sense an absolute elevation or change in elevation between the field surface and the toolbar or a combination of both the frame member and the toolbar.

13. (Previously Presented) The system of claim 12, further comprising a controller configured to receive one or more signals from the one or more electromagnetic sensors and cause actuation of the actuator based on the one or more signals.

14. (Original) The system of claim 13, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

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15. (Original) The system of claim 14, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

16. (Original) The system of claim 13, wherein the controller is further configured to cause adjustment of a rate of rotation based on the one or more signals from the one or more electromagnetic sensors.

17. (Original) The system of claim 12, wherein the one or more electromagnetic sensors comprise ultrasonic, lidar, or radar sensors.

18. (Original) The system of claim 1, wherein the actuator is configured to rotate the toolbar throughout an obtuse angle range.

19. (Previously Presented) A control system for an implement comprising a frame member and a toolbar coupled to the frame member parallel to the frame member via a hinged joint, wherein a plurality of row units are secured to the toolbar, the control system comprising:

a controller;

at least one sensor configured to sense a position of the toolbar relative to ground; and

an actuator coupled between the frame member and the toolbar, wherein the controller is configured to receive at least one signal from the at least one sensor indicating

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the position of the toolbar relative to the ground and cause the actuator to rotate the toolbar based on the sensed position of the toolbar.

20. (Previously Presented) A computer-implemented method for an implement that comprises a toolbar that has a plurality of row units secured thereto, the method for adjusting a rotation of the toolbar based on a contour of a field on which the implement traverses, the method comprising:

at a controller:

receiving an indication of a first angle change of the toolbar relative to ground;

causing an actuator that pivotably couples the toolbar to the frame member to retract based on the indication of the first angle change;

receiving an indication of a second angle change of the toolbar relative to the ground; and

causing the actuator to extend based on the indication of the second angle change.

21. (Previously Presented) The system of claim 1, further comprising at least one wheel coupled to the frame member and at least partially supporting the frame member relative to the ground.

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Electronic Acknowledgement Receipt

EFS ID:	44559277
Application Number:	16470472
International Application Number:	
Confirmation Number:	1653
Title of Invention:	IMPLEMENT CONTOURING TOOLBAR
First Named Inventor/Applicant Name:	Benjamin Anson Fanshier
Customer Number:	88988
Filer:	Linda Blankenship
Filer Authorized By:	
Attorney Docket Number:	US16/40/WO/US-2
Receipt Date:	20-DEC-2021
Filing Date:	17-JUN-2019
Time Stamp:	11:54:50
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		US1640WOUS-2_FOA_response_withAppendixFiled.pdf	666886 0adff7371cbad44a4097c5d7d9aa02e6f07abffb	yes	17

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Response After Final Action	1	1
	Claims	2	6
	Applicant Arguments/Remarks Made in an Amendment	7	17
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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

REMARKS

The Final Office Action dated October 28, 2021, has been received and reviewed. Claims 1 and 3-21 are pending in the application. Claims 1 and 3-21 stand rejected.

Applicant respectfully requests reconsideration of the application.

Claim Rejections under 35 U.S.C. § 102

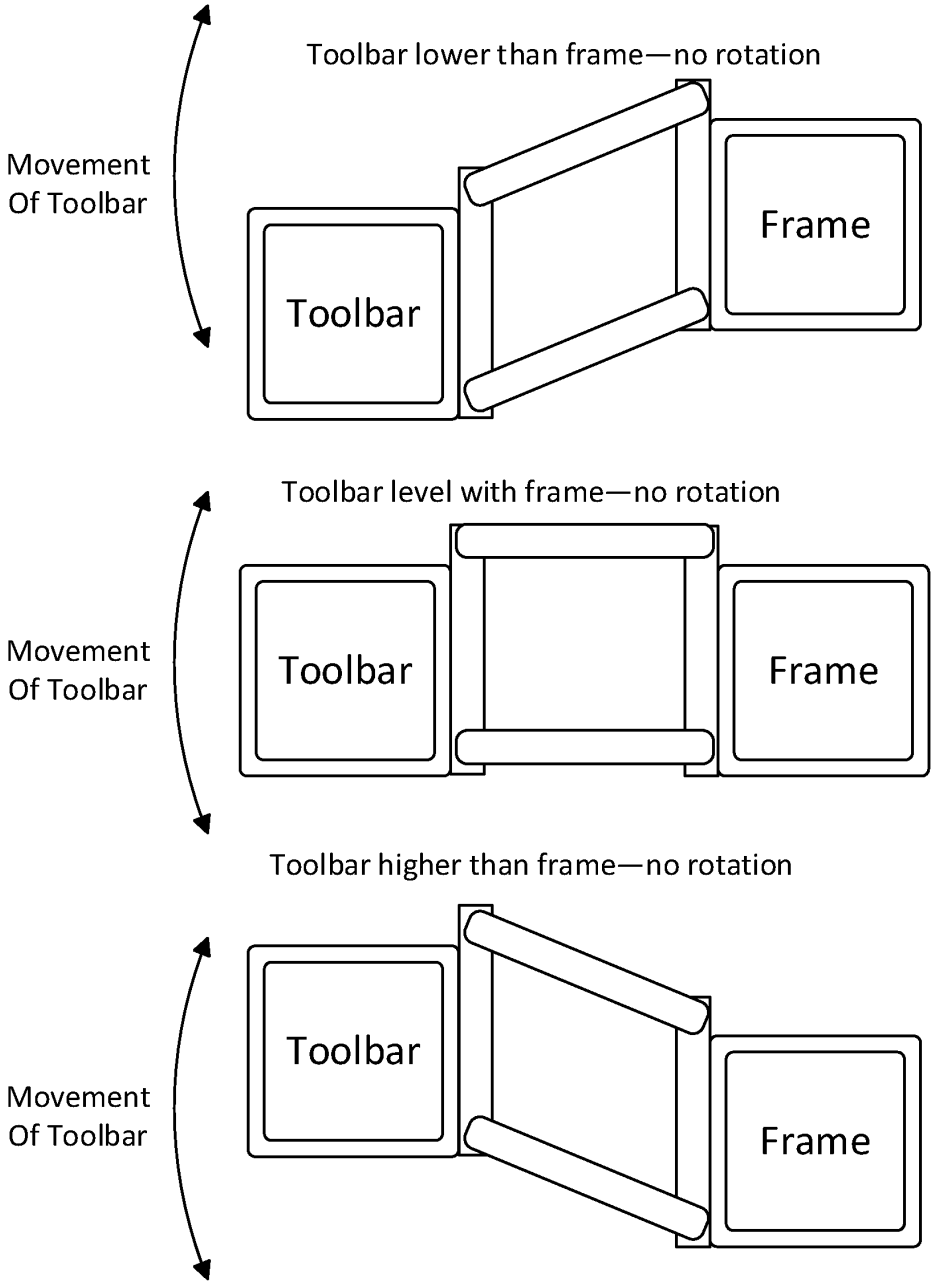
Claims 1, 8-16, and 18-21 stand rejected under 35 U.S.C. § 102(a)(1) as anticipated by U.S. Patent 8,573,319 ("Casper"). Applicant respectfully traverses this rejection.

The 35 U.S.C. § 102 rejection of claims 1, 8-16, 18, and 21 is improper because Casper does not expressly or inherently disclose "an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar relative to the frame member based on a sensed position of the toolbar," as recited in claim 1.

Casper discloses a third frame section 85 pivotally coupled to a first frame section 20 by a parallel linkage such that its height is controlled by an actuator 300 (parallel linkage not numbered, but shown best in FIG. 7).

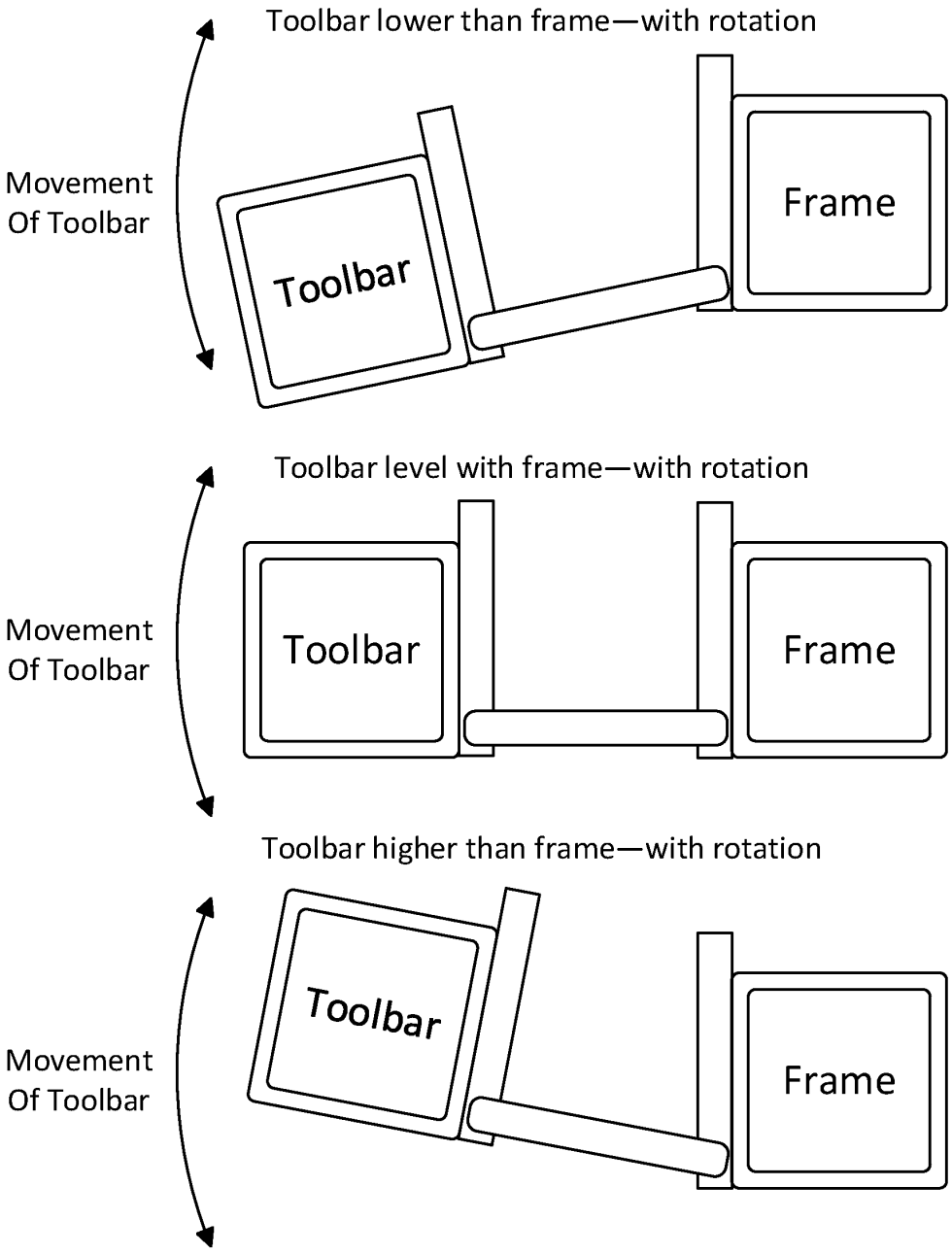
The Office relies on the actuator 300 as being configured to rotate the toolbar 85. However, because the toolbar 85 is connected by a parallel linkage, the toolbar 85 does not rotate relative to the second frame section 65. The toolbar 85 instead may be raised and lowered relative to the second frame section 65. The toolbar 85 revolves around the section frame section 65, but does not rotate. This motion is common to toolbars connected to frames by parallel linkages, and is illustrated in three different positions below:

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In all three of these positions of the toolbar, the toolbar is in the same orientation relative to the frame. Only its position (height and lateral distance) around the frame has changed. This motion is referred to as "revolution." *See* Surbhi S, *Difference between Rotation and Revolution*, https://keydifferences.com/difference-between-rotation-and-revolution.html, March 1, 2021, (last visited December 17, 2021, copy attached as

Appendix A). In contrast, the motion of the toolbar illustrated below includes both revolution and rotation (see also, Applicant's FIG. 3):



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In these three positions of the toolbar, the toolbar is in a different orientation relative to the frame, and thus, the toolbar has rotated. Its position (height and lateral distance) around the frame has also changed.

Casper does not disclose "an actuator . . . configured to rotate the toolbar relative to the frame member," but only an actuator configured to cause revolution of the toolbar about the frame member.

Therefore, claim 1 is not anticipated by the disclosure of Casper. Claims 8-16, 18, and 21 are not anticipated at least because they depend from claim 1.

Claim 18 is further allowable because Casper does not disclose that "the actuator is configured to rotate the toolbar throughout an obtuse angle range." The Office relies on FIG. 1 of as disclosing this element. However, there is no such disclosure in FIG. 1. The Office has not responded to this point in the Final Office Action or provided any additional information about how the Office is interpreting FIG. 1 of Casper to disclose this element. Applicant respectfully requests that the Office clarify the rejection of claim 18.

Claims 19 and 20 are not anticipated for similar reasons as claim 1. The 35 U.S.C. § 102 rejection of claim 19 cannot be maintained because Casper does not expressly or inherently disclose a control system having "an actuator coupled between the frame member and the toolbar, wherein the controller is configured to receive at least one signal from the at least one sensor indicating the position of the toolbar relative to the ground and cause the actuator to rotate the toolbar based on the sensed position of the toolbar," as recited in claim 19.

The 35 U.S.C. § 102 rejection of claim 20 cannot be maintained because Casper does not expressly or inherently disclose "receiving an indication of a first angle change of the toolbar relative to ground; causing an actuator that pivotably couples the toolbar to the frame member to retract based on the indication of the first angle change; receiving an indication of a second angle change of the toolbar relative to the ground; and causing the actuator to extend based on the indication of the second angle change," as recited in claim 20. Because the toolbar of Casper does not rotate, there is no disclosure of indications of angle changes of the toolbar relative to ground.

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Furthermore, because the toolbar is connected by a parallel linkage, extension or retraction of an actuator cannot cause the angle of the toolbar to change.

Applicant respectfully requests that the rejection of claims 1, 8-16, and 18-21 under 35 U.S.C. § 102(a)(1) based on Casper be withdrawn.

Claim Rejections under 35 U.S.C. § 103

Claims 3-7 stand rejected under 35 U.S.C. § 103 as being unpatentable over Casper in view of U.S. Patent Publication 2019/0021211 ("Gutknecht"). Applicant respectfully traverses this rejection.

The 35 U.S.C. § 103 rejection of claims 3-7 is improper because Casper in view of Gutknecht does not teach, suggest, or otherwise render obvious "an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar relative to the frame member based on a sensed position of the toolbar," as recited in claim 1, from which these claims depend.

The teachings of Casper are summarized above with respect to 35 U.S.C. § 102. In particular, there is no teaching in Casper of an actuator . . . configured to rotate the toolbar relative to the frame member.

The Office relies on Gutknecht as teaching a sensor 70 for measuring the angle of a parallel linkage 60. *Office Action*, p. 5. However, Gutknecht does not teach "an actuator . . . configured to rotate the toolbar relative to the frame member." Therefore, Gutknecht does not cure the deficiency of Casper with respect to claim 1.

Therefore, claim 1 is allowable. Claims 3-7 are each allowable at least because each depends from claim 1. Applicant respectfully requests that the rejection of claims 3-7 under 35 U.S.C. § 103 be withdrawn.

Claim 17 stands rejected under 35 U.S.C. § 103 as being unpatentable over Casper alone. Applicant respectfully traverses this rejection.

The 35 U.S.C. § 103 rejection of claim 17 cannot be maintained because as discussed above, Casper does not teach, suggest, or otherwise render obvious "an actuator coupled between the frame member and the toolbar, the actuator configured to

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rotate the toolbar relative to the frame member based on a sensed position of the toolbar," as recited in claim 1, from which claim 17 depends.

Applicant respectfully requests that the rejection of claim 17 under 35 U.S.C. § 103 be withdrawn.

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CONCLUSION

Claims 1 and 3-21 are believed to be in condition for allowance. Should the Examiner determine that additional issues remain that might be resolved by a telephone conference, the Examiner is respectfully invited to contact Applicant's undersigned attorney.

Respectfully submitted:

By: /Nathan E. Whitlock/

Nathan E. Whitlock
Reg. No.: 65,744
AGCO Corporation
Patent Department
420 W Lincoln Blvd
Hesston, KS 67062
Phone: (620) 327-6993

December 20, 2021

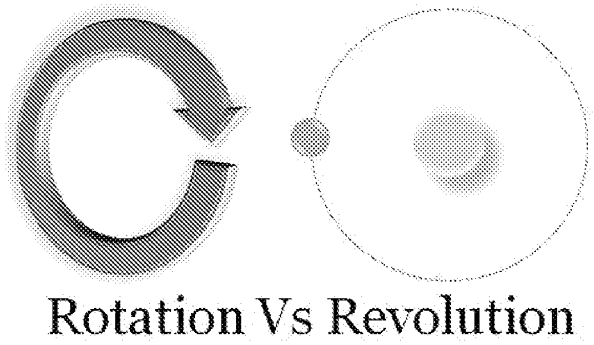
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Appendix A:

Surbhi S, *Difference between Rotation and Revolution*, https://keydifferences.com/difference-between-rotation-and-revolution.html, March 1, 2021, (last visited December 17, 2021)

Difference Between Rotation and Revolution

Last updated on March 1, 2021 by Surbhi S



The motion along a curved path is termed as circular motion, like the orbital motion of planets, ice skater, blades of the fan, gears, amusement park rides, etc. The two fundamental concepts which are studied in circular motion are rotation and revolution. While **rotation** means the movement in a circle round an axis, **revolution** is when an object moves in a circular path around another object or center.

Many people often misinterpret these two concepts as they think that these two are same. But this is not so, as they differ from one another in the sense that rotation does not change the position of the object, but revolution does. So, here we've explained the difference between rotation and revolution in detail, take a read.

Content: Rotation Vs Revolution

1. Comparison Chart
2. Definition
3. Key Differences
4. Conclusion

Comparison Chart

BASIS FOR COMPARISON	ROTATION	REVOLUTION
Meaning	Rotation refers to a circular motion around an axis, located within the body of the object.	Revolution means a circular motion around an axis, located outside the object.

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Difference Between PERT and CPM
Difference Between Micro and Macro Economics
Difference Between Developed Countries and Developing Countries
Difference Between Management and Administration
Difference Between Qualitative and Quantitative Research

RELATED DIFFERENCES

Difference Between Crowdfunding and Traditional Fundraising
Difference Between IPO and FPO
Difference Between Subsistence and Commercial Farming
Difference Between Visa and MasterCard
Difference Between Brand Equity and Brand Value

NEW ADDITIONS

Difference Between APC and MPC
Difference Between Ungrouped Data and Grouped Data
Difference Between Allowances and Perquisites
Difference Between Normal Loss and Abnormal Loss

BASIS FOR COMPARISON	ROTATION	REVOLUTION
What is it?	Movement of an object on its axis.	A complete round trip around something.
Axis	Internal	External
Change in position	No	Yes
Earth	Rotation of earth, is from west to east, which causes day and night.	Revolution of earth is in counterclockwise manner, which causes seasons.
Example	Hand of clocks, Spinning top, etc.	Rounding a curve in a car, merry go round etc.

Definition of Rotation

The term 'rotation' is defined as the movement of an object, in a circular manner, about a certain point, i.e. turn around, its own axis. There exist an imaginary line known as the rotational axis around which a three-dimensional object rotates.

In the rotation, every point makes a circle around the central point. So, there is an equal distance from the center to any point of the shape. It is expressed in terms of degrees, wherein when the rotation is performed clockwise, the degrees is negative, while an anticlockwise rotation, will result in positive degrees.

The most popular example of rotation is the earth's rotation, which takes approximately 24 hours to complete it, causing day and night.

Definition of Revolution

The term 'revolution' is used to describe a motion, wherein an object moves in a circular direction around an object or centre, in a fixed path or orbit. It involves travelling around an axis outside the object, i.e. external axis.

The distance traveled by an object, in one revolution, around the circle, is nothing but its circumference. The time taken by an object to complete one revolution around the circle is known as the period, represented by T.

The revolution of the Earth around the Sun is in an anticlockwise manner, which takes 365 days and 6 hours to complete. It is the only reason for causing seasons to change.

Difference Between Cost Audit and Management Audit

Difference Between Unqualified and Qualified Report

Difference Between Multi-Channel and Omni-Channel

Difference Between Listed Company and Unlisted Company

Difference Between Denotation and Connotation

Difference Between Managing Director and Whole time Director

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Key Difference Between Rotation and Revolution

The difference between rotation and revolution can be drawn clearly on the following grounds:

1. A circular motion around an axis, located within the body of the object, is called rotation. A circular motion around an axis, located outside the object, is called a revolution.
2. Rotation is the movement of an object on its own axis. On the other hand, revolution is the complete round trip around something, i.e. another object or center.
3. Rotation is when the object spins around an internal axis. Conversely, revolution is when the object travels around an external axis.
4. In the rotation, the object moves around its axis, without changing its position. As against this, in the revolution, the object moves along an elliptical course, with a continuous change in its position.
5. Earth's rotation is from the west towards the east, which it completes in approx. 24 hours. But, the revolution of the Earth around the Sun is in a counterclockwise manner when you are looking at it from a North direction, i.e. from the North Pole i.e. west to east., which is completed in around, 365 days.
6. Common examples of rotation are the hand of clocks, spinning top, etc. In contrast, the common examples of revolution are rounding a curve in a car, kids merry go round, etc.

Conclusion

Therefore, with the above discussion, you might have gained ample knowledge about the two terms, and will not get confused between them in future. While rotation means spinning around its own axis, revolution means moving around another object. Taking the example of the Earth, which rotates 366 times to complete one revolution around the Sun.

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/470,472	Filing Date 06/17/2019	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

	(Column 1)	(Column 2)			
FOR	NUMBER FILED	NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

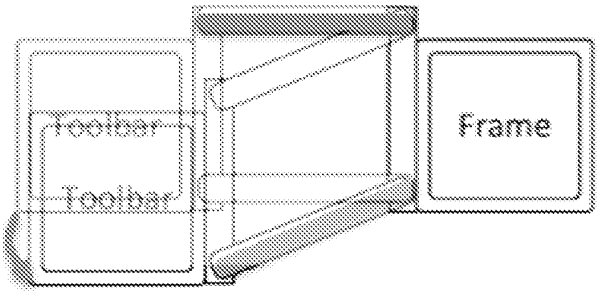
AMENDMENT	12/20/2021	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/SHARAIN E MORELAND/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/470,472	06/17/2019	Benjamin Anson Fanshier	US16/40/WO/US-2	1653

88988 7590 02/04/2022

AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston, KS 67062

EXAMINER
LUTZ, JESSICA H

ART UNIT	PAPER NUMBER
3671	

NOTIFICATION DATE	DELIVERY MODE
02/04/2022	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patents@agcocorp.com

Advisory Action Before the Filing of an Appeal Brief	**Application No.** 16/470,472	**Applicant(s)** Fanshier et al.	
	Examiner JESSICA H LUTZ	**Art Unit** 3671	**AIA (FITF) Status** Yes

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 20 December 2021 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

NO NOTICE OF APPEAL FILED

1. ☑ The reply was filed after a final rejection. No Notice of Appeal has been filed. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114 if this is a utility or plant application. Note that RCEs are not permitted in design applications. The reply must be filed within one of the following time periods:
   a) ☐ The period for reply expires ____ months from the mailing date of the final rejection.
   b) ☑ The period for reply expires on: (1) the mailing date of this Advisory Action; or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.
   c) ☐ A prior Advisory Action was mailed more than 3 months after the mailing date of the final rejection in response to a first after-final reply filed within 2 months of the mailing date of the final rejection.The current period for reply expires ____ months from the mailing date of *the prior Advisory Action* or SIX MONTHS from the mailing date of the final rejection, whichever is earlier.

   Examiner Note: If box 1 is checked, check either box (a), (b) or (c). ONLY CHECK BOX (b) WHEN THIS ADVISORY ACTION IS THE FIRST RESPONSE TO APPLICANTS FIRST AFTER-FINAL REPLY WHICH WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. ONLY CHECK BOX (c) IN THE LIMITED SITUATION SET FORTH UNDER BOX (c). See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) or (c) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37CFR 41.37(a).

AMENDMENTS

3. ☐ The proposed amendments filed after a final rejection, but prior to the date of filing a brief, will not be entered because
   a) ☐ They raise new issues that would require further consideration and/or search (see NOTE below);
   b) ☐ They raise the issue of new matter (see NOTE below);
   c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.

   NOTE: _____ (See 37CFR 1.116 and 41.33(a)).
4. ☐ The amendments are not in compliance with 37CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicants reply has overcome the following rejection(s): _____
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☐ For purposes of appeal, the proposed amendment(s):(a)☐ will not be entered, or (b)☐ will be entered, and an explanation of how the new or amended claims would be rejected is provided below or appended.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____
9. ☐ The affidavit or other evidence filed after final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
10. ☐ The affidavit or other evidence filed after the date of filing the Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
11. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

12. ☑ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: See Continuation Sheet.
13. ☐ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____
14. ☑ Other: Attached Rotation.pdf.

STATUS OF CLAIMS

15. The status of the claim(s) is (or will be) as follows:
    Claim(s) allowed:_____.
    Claim(s) objected to:_____.
    Claim(s) rejected:1 and 3-21.
    Claim(s) withdrawn from consideration:_____.

/JESSICA H LUTZ/ Primary Examiner, Art Unit 3671	

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Continuation of REQUEST FOR RECONSIDERATION/OTHER 12. The request for reconsideration has been considered but does NOT place the application in condition for allowance because: Applicant argues there is no rotation of the toolbar relative to the frame. Examiner disagrees. As can be seen in Fig. 6 to 7 as actuator 300 moves, the space between the end linkage of the parallel linkage and the end of the frame changes. Therefore, there is a slight rotational movement of the toolbar relative to the frame due to actuation of the cylinder. Further, please refer to the attached PDF of applicant's illustrations submitted within the arguments, showing the rotation. Within these illustrations, for the linkage length to remain constant during pivoting, the toolbar must rotate as well.
With regards to claim 18, the claim is a broad functional statement that does not provide structural features necessary to perform the function. The angle is not defined in relation to the toolbar rotating around the fixed frame point. The limitation "configured to rotate the toolbar throughout an obtuse angle range" is met by the ability of the actuator to move the toolbar through the obtuse angle of the linkage.

DO NOT ENTER: /J.H.L/

PATENT

UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor (First):	FANSHIER, Benjamin Anson	Art Unit:	3671
Application No.:	16/470,472	Examiner:	Lutz, Jessica H.
Filed:	June 17, 2019	Docket No.:	US16/40/WO/US-2
Confirmation No.:	1653		

Title: **IMPLEMENT CONTOURING TOOLBAR**

Electronically Filed December 20, 2021

RESPONSE TO FINAL OFFICE ACTION UNDER 37 CFR § 1.116

Commissioner for Patents
Mail Stop – Amendment
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

In response to the Final Office Action dated October 28, 2021:

A Listing of the Claims begins on page 2 of this paper;

Remarks begin on page 7 of this paper.

To: patents@agcocorp.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 88988

Feb 04, 2022 05:42:17 AM

Dear PAIR Customer:

AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston, KS 67062
UNITED STATES

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Application	Document	Mailroom Date	Attorney Docket No.
16470472	CTAV	02/04/2022	US16/40/WO/US-2

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16470472
Filing Date	2019-06-17
First Named Inventor	Benjamin Anson FANSHIER
Art Unit	3671
Examiner Name	Jessica H. Lutz
Attorney Docket Number	US16/40/WO/US-2

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	9301439	B2	2016-04-05	VADERSTAD HOLDING AB	cited in 3rd party submittal for BR Application

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	Attorney Docket Number	US16/40/WO/US-2

	1	INPI, Notice of 3rd Party Petition submitted for related Brazilian Patent Appliation No. BR112019010534-4, dated 17 JAN 2022, 30 pages.	X

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Linda Blankenship/	Date (YYYY-MM-DD)	2022-02-15
Name/Print	Linda Blankenship	Registration Number	75274

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

INSTITUTO NACIONAL DA PROPRIEDADE INDUSTRIAL

17/01/2022 870220004301 16:44

0000421945275275

Apresentação de subsídios ao exame técnico

Número do Processo: BR 11 2019 010534 4

Dados do Interessado

Interessado 1 de 1

Nome ou Razão Social: JIMER RAMOS DA COSTA

Tipo de Pessoa: Pessoa Fisica

CPF/CNPJ: 83751505768

Nacionalidade: Britânica

Qualificação Física: Advogado

Endereço: RUA DA QUITANDA 199, SALA 703, CENTRO

Cidade: Rio de Janeiro

Estado: RJ

CEP: 20091005

País: Brasil

Telefone: 2131741515

Fax:

Email: mar22celo@hotmail.com

Referência Petição

Pedido : BR112019010534-4

Documentos anexados

Tipo Anexo	Nome
Esclarecimento	OP1112BR00 Subsídios ao Exame.pdf
D1 US9301439B2	D1 US9301439B2.pdf
D2 US2015230391A1	D2 US2015230391A1.pdf
D3 CA2289293A1	D3 CA2289293A1_compressed.pdf
D4 US8573319B1	D4 US8573319B1.pdf

PETICIONAMENTO ELETRÔNICO

Esta solicitação foi enviada pelo sistema Peticionamento Eletrônico em 17/01/2022 às 16:44, Petição 870220004301

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
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Declaração de veracidade

☑ Declaro, sob as penas da lei, que todas as informações acima prestadas são completas e verdadeiras.

PETICIONAMENTO ELETRÔNICO

Esta solicitação foi enviada pelo sistema Peticionamento Eletrônico em 17/01/2022 às 16:44, Petição 870220004301

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
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Pedido de Patente de Invenção: BR112019010534-4 de 23/05/2019
PCT: #PCT/IB2017/001298 de 26/10/2017
Prioridade: US #62/435,118 de 16/12/2016
Título: MAQUINÁRIO QUE CONTORNA BARRA DE FERRAMENTAS
Titular: AGCO CORPORATION

JIMER RAMOS DA COSTA, brasileiro, casado, CPF 837.515.057-68, OAB/RJ 57.611, devidamente qualificado na petição que a esta antecede, na condição de interessado em pesquisa e desenvolvimento de tecnologias atinentes a máquinas e implementos agrícolas, vem a presença do Sr. Examinador, nos termos do artigo 31 da Lei de Propriedade Industrial (LPI), apresentar

SUBSÍDIOS AO EXAME TÉCNICO

do pedido de patente de invenção **BR112019010534-4**, intitulado **"Maquinário que contorna barra de ferramentas"**, depositado em 23/05/2019 em nome de **AGCO CORPORATION**, porquanto este não atende aos requisitos de patenteabilidade, devendo ser INDEFERIDA na sua integridade, pelas razões ora trazidas ao exame.

I – DA TEMPESTIVIDADE:

1. Conforme estabelece o Artigo 31 da Lei de Propriedade Industrial Nº 9.279 de 14 de maio de 1996 (LPI), JIMER RAMOS DA COSTA vem, em legítimo interesse, apresentar documentos e informações para subsidiarem o exame da patente em questão.

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"... Publicado o pedido de patente e até o final do exame, será facultada a apresentação, pelos interessados, de documentos e informações para subsidiarem o exame."

II – DO PEDIDO DE PATENTE BR112019010534-4:

2. O presente pedido diz respeito a um sistema com um elemento de armação (20), uma barra de ferramentas (22) acoplada ao dito elemento de armação por meio de uma junção articulada e paralela ao elemento de armação; uma unidade de fileiras acoplada à barra de ferramentas, um sensor (50) para detectar a posição da barra de ferramentas em relação ao chão e um acionador acoplado entre o elemento de armação e a barra de ferramentas para giar a barra de ferramentas contendo as ditas unidade de fileiras em relação ao ao elemento de armação com base na posição da barra de ferramentas em relação ao chão, detectada pelo dito sensor.

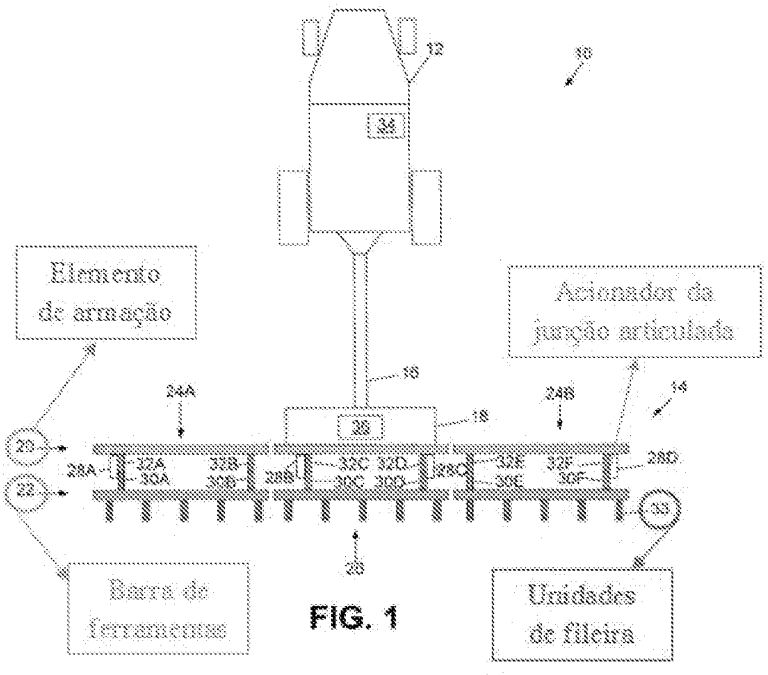
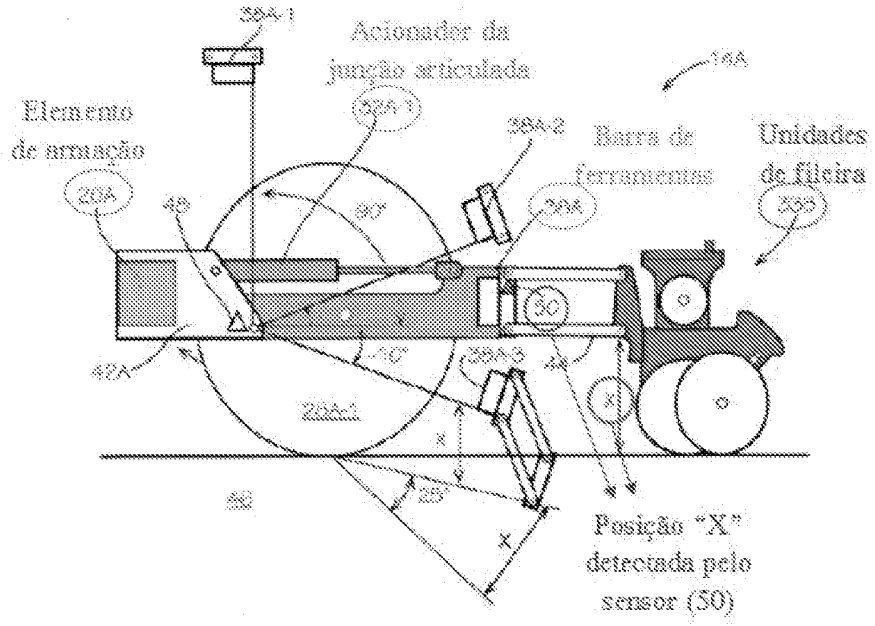


FIG. 1

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III – DOS REQUISITOS DE PATENTEABILIDADE:

3. De acordo com a Lei de Propriedade Industrial Nº 9.279 de 14 de maio de 1996 (LPI), Artigo 8º, *"É patenteável a invenção que atenda aos requisitos de novidade, atividade inventiva e aplicação industrial."*.

4. Para fins desta lei, a invenção é dotada de novidade quando não compreendida no estado da técnica, conforme estabelece o seu Artigo 11º e de atividade inventiva sempre que, para um técnico no assunto, não decorra de maneira evidente ou óbvia do estado da técnica, conforme o seu Artigo 13º.

5. Isto posto, o Requerente vem esclarecer que o pedido em questão, no mínimo, NÃO ENVOLVE ATIVIDADE INVENTIVA frente ao estado da técnica conhecido à época de seu depósito. Portanto, o presente pedido patente de invenção não atende ao disposto nos Artigos 8º c/c 13º da LPI, conforme se depreenderá da

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análise dos documentos ora trazidos, os quais impedem a concessão do pedido aqui em voga.

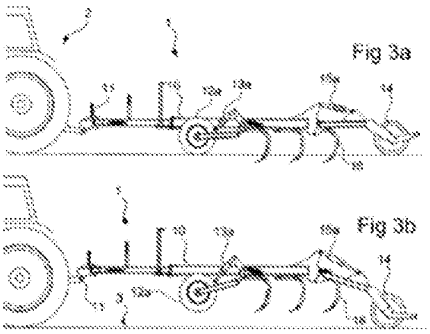
IV – DOS DOCUMENTOS DO ESTADO DA TÉCNICA:

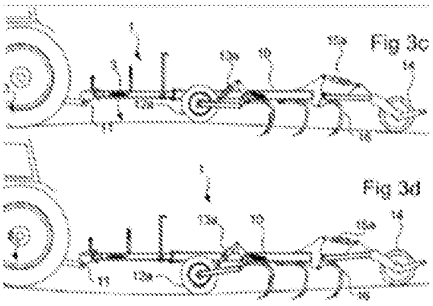
6. Os documentos abaixo pertencem ao estado da técnica, uma vez que foram publicados em data anterior a data de depósito do pedido de patente de invenção **BR112019010534-4** e mostraram-se relevantes quanto à atividade inventiva desta patente.

D1: US9301439B2 – Agricultural implement and method for controlling an agricultural implement – publicado em 05/04/2016.

D1 descreve um implemento agrícola para trabalhar o solo, através do qual o implemento agrícola viaja ou é rebocado, inclui uma estrutura, uma primeira unidade de manutenção de profundidade, incluindo um primeiro atuador hidráulico para ajustar a altura da primeira unidade de manutenção de profundidade em relação à estrutura, uma segunda unidade de manutenção de profundidade, incluindo um segundo atuador hidráulico para ajustar a altura da segunda unidade de manutenção de profundidade em relação à estrutura, pelo menos uma ferramenta de trabalho de solo e um sistema hidráulico incluindo os atuadores hidráulicos configurados para serem conectados a um mecanismo de fornecimento de fluido hidráulico ao sistema hidráulico. Um primeiro lado do primeiro atuador hidráulico se comunica com um primeiro lado do segundo atuador hidráulico e um mecanismo de medição configurado para fornecer um valor medido correspondente a uma primeira quantidade de fluido hidráulico ocorrendo nos referidos primeiros lados.

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Os documentos que se seguem foram citados no parecer de exigência preliminar publicado sob o despacho 6.23, na Revista de Propriedade Industrial nº 2644 de 08/09/2021, ao que o Requerente deu cumprimento por meio da petição nº 870210111916 em 02/12/2021, alegando, de maneira superficial, que tais documentos não ensinam *"uma barra de ferramentas alongada acoplada à armação por meio de uma junção articulada ou um acionador configurado para girar a barra de ferramentas"*. Entretanto, esperamos que tal alegação seja refutada, uma vez que, conforme será a seguir demonstrado, os documentos abaixo já ensinam as características técnicas reivindicadas como novas e inventivas no presente pedido de patente.

D2: US2015230391A1 - Depth control for a seed planting system – publicado em 20/08/2015.

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O sistema de plantio descrito em **D2** inclui uma pluralidade de conjuntos de linha de semeadura, cada um tendo componentes mantidos em uma elevação controlada. O conjunto de linha de semeadura inclui uma unidade de linha de cultivo controlada para manter uma elevação desejada em relação a uma unidade de linha de semeadura, a unidade de linha de semeadura sendo configurada para seguir passivamente o terreno local. Cada conjunto de linha de semeadura pode incluir dois sensores de posição que geram sinais correspondentes à elevação da unidade de linha de semeadura e o anexo de engate no solo, respectivamente, ou um sensor de posição diferencial que gera sinais correspondentes à diferença nas elevações. Várias modalidades incluem um controlador de circuito fechado local que ajusta a elevação da unidade de linha de cultivo em relação à unidade de linha de semeadura para um ponto de ajuste desejado. Em algumas modalidades, a força descendente da unidade de linha de semeadura é ativamente controlada.

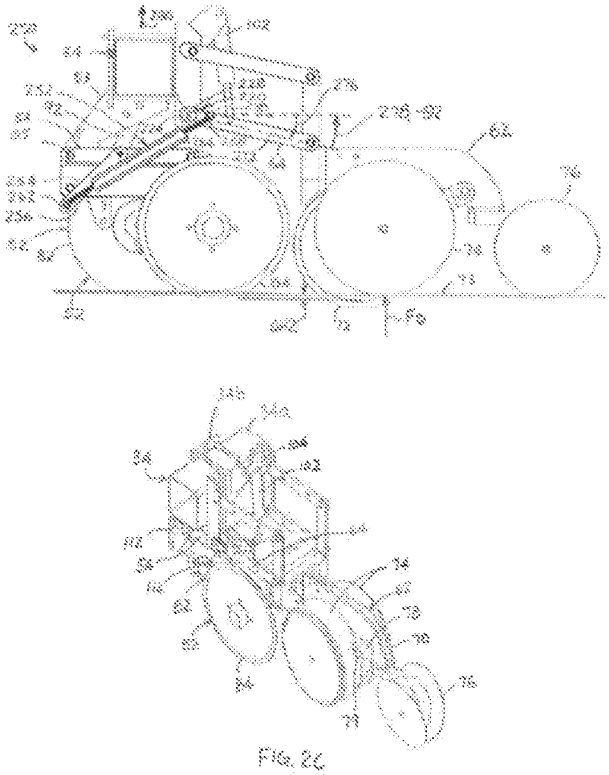


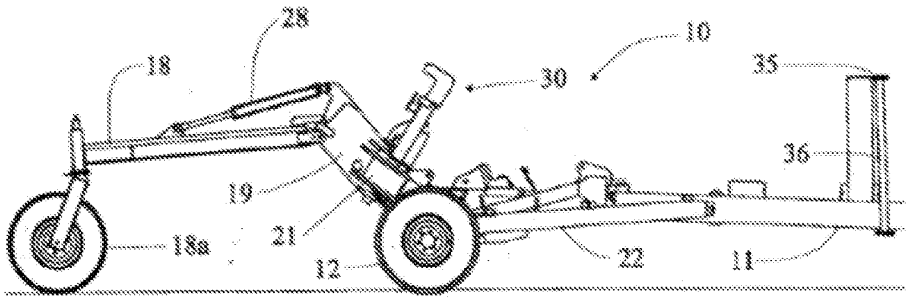
FIG. 2C

Petição 870220004301, de 17/01/2022, pág. 8/138

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D3: CA2289293A1 – Field marker control system for agricultural planters - publicado em 20/01/2009.

O documento **D3** descreve um sistema de controle fornecido para implantar automaticamente os marcadores de campo em uma plantadora agrícola de uma maneira alternada, sem a necessidade de intervenção do operador. O sistema de controle utiliza um sensor de proximidade para determinar se a barra de ferramentas está vindo da posição de trabalho abaixada para a posição de cabeceira elevada ou viceversa. Válvulas solenoides no circuito hidráulico para os atuadores do marcador de campo são ativadas para retrair ambos os atuadores para retrair o implantado dos marcadores de campo quando a barra de ferramentas é movida para a posição da cabeceira. Quando a barra de ferramentas é retornada à posição de trabalho após fazer uma curva nas cabeceiras do campo, o sistema de controle lembra qual marcador de campo acabou de ser implantado e então estende o outro marcador de campo para pontuar o campo. O sistema de controle permite que o operador fique atento ao giro do trator e implemento nas cabeceiras e na fixação do implemento de plantio no solo em local adequado para o plantio da cultura.



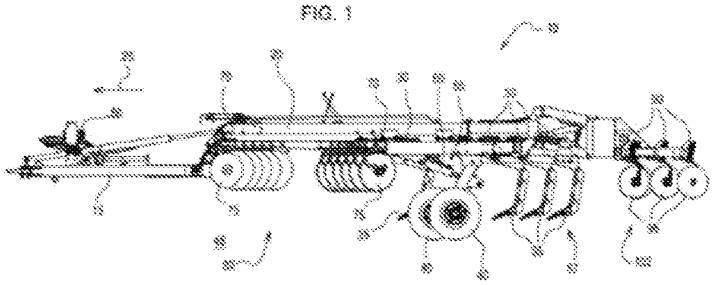
D4: US8573319B1 – Position and pressure depth control system for an agricultural implement – publicado em 05/11/2013.

A invenção descrita em **D4** revela um sistema de controle para um implemento agrícola. O sistema de controle inclui um sensor de posição configurado para medir uma indicação de profundidade de uma profundidade operacional real de uma

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ferramenta de engajamento no solo e configurado para gerar um sinal de posição correspondente. Um sensor de pressão configurado para medir uma indicação de pressão de uma pressão operacional real e configurado para gerar um sinal de pressão correspondente. Uma unidade de controle de implemento configurada para receber o sinal de posição e o sinal de pressão e configurada para controlar um dispositivo de ajuste de modo que a indicação de profundidade almeje um ponto de ajuste de profundidade que é indicativo da profundidade operacional pré-selecionada, desde que a indicação de pressão esteja dentro de um pré-intervalo de pressão selecionado.

FIG. 1



V - DA AUSÊNCIA DE ATIVIDADE INVENTIVA DO PEDIDO BR112019010534-4

7. Em seu Relatório Descritivo, o documento que aqui se refuta cita em seu parágrafo [002] que os implementos agrícolas atuais possuem seções longas e rígidas que não operam bem em campos irregulares, como depressões ou planaltos que comprometem a habilidade das unidades de fileiras de operar adequadamente no campo. Como um exemplo, quando uma plantadeira se depara com um planalto, a armação das rodas suspende as unidades de fileiras a ponto de suspendê-las do chão. Por outro lado, à medida que as rodas descem pela parte traseira do planalto, todo o peso da armação repousa sobre as unidades de fileiras. Em ambos os casos, os possíveis resultados prejudiciais incluem produtividade insuficiente de cultura devido a profundidade na qual as sementes são plantadas, superficiais ou profundas demais.

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8. De modo a propor uma **solução** ao problema do estado da técnica apontado, o pedido **BR112019010534-4** descreve um elemento de armação, uma barra de ferramentas acoplada ao dito elemento de armação, a barra de ferramenta estando paralela e na traseira do elemento de armação; unidades de fileiras acoplada à barra de ferramentas. A rotação da barra de ferramentas contendo as unidades de fileiras é controlada por um sensor acoplado a barra de ferramentas, configurado para detectar uma posição da barra de ferramentas em relação ao chão; e um acionador acoplado entre o elemento de armação e a barra de ferramentas, configurado para girar a barra de ferramentas em relação ao elemento de armação com base em uma posição detectada da barra de ferramentas.

9. De acordo com o art. 5º, itens I e II da Instrução Normativa nº 30, as **Reivindicações Independentes devem proteger as características técnicas essenciais à realização da invenção**.

> **Art. 5º** As reivindicações independentes deverão cumprir as seguintes especificações:
>
> I. as reivindicações independentes visam a proteção de características técnicas essenciais e específicas da invenção em seu conceito integral, cabendo a cada categoria de reivindicação pelo menos uma reivindicação independente;
>
> II. cada reivindicação independente deve corresponder a um determinado conjunto de características essenciais à realização da invenção, sendo que somente será admitida mais de uma reivindicação independente da mesma categoria se tais reivindicações definirem diferentes conjuntos de características alternativas e essenciais à realização da invenção, ligadas pelo mesmo conceito inventivo;

10. Deve-se ainda considerar que o presente pedido de patente foi objeto de exigência preliminar (despacho 6.23), publicada na RPI 2644 de 08/09/2021. O titular do pedido apresentou manifestação a esta exigência através da petição 870210111916, de 02/12/2021, na qual apresentou novas vias do Relatório Descritivo, Reivindicações e Resumo.

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11. Portanto, de acordo com o novo quadro apresentado pelo titular, o presente pedido de patente propõe um sistema, um sistema de controle para um maquinário e um método implantado em computador para um maquinário, cujas características técnicas definidas nas suas **Reivindicações independentes 1, 19 e 20** são as **características particulares necessárias** para solucionar o problema do estado da técnica acima mencionado. Com isto, temos que as Reivindicações 1, 19 e 20 definem:

> *"1. Sistema, **caracterizado pelo fato** de compreender:*
> *um elemento de armação alongado (20);*
> *uma barra de ferramentas alongada (22) **acoplada ao** elemento de armação (20) **por meio de uma junção articulada**, a barra de ferramentas (22) orientada **paralela ao** elemento de armação (20);*
> ***uma** pluralidade de unidades de fileiras (33) **acoplada à** barra de ferramentas (22);*
> *um primeiro sensor (50) configurado **para detectar uma posição da** barra de ferramentas (22) **em relação ao chão**; e*
> *um acionador (32) **acoplado entre** o elemento de armação (20) e a barra de ferramentas (22), o acionador (32) configurado **para girar** a barra de ferramentas (22) **em relação ao** elemento de armação (20) **com base em uma posição detectada da barra de ferramentas (22)**."*

> *"19. Sistema de controle (74) para um maquinário **caracterizado pelo fato** de que compreende um elemento de armação alongado (20) e uma barra de ferramentas alongada (22) **acoplada no** elemento de armação (20) **paralela à** armação **por meio de uma junção articulada**, no qual **presas à***

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barra de ferramentas (22) ***estão uma pluralidade de*** *unidades de fileiras (33), o sistema de controle compreendendo:*

um controlador (34)*;*

pelo menos um sensor (48, 50, 80) configurado ***para detectar a posição da*** *barra de ferramentas (22)* ***em relação ao chão****; e*

um acionador (32) ***acoplado entre*** *o elemento de armação (20) e a barra de ferramentas (22), no qual* ***o controlador (34)*** *é configurado* ***para receber pelo menos um sinal do pelo menos*** *um sensor* ***indicando a posição da*** *barra de ferramentas (22)* ***em relação ao chão*** *e fazer o acionador (32)* ***girar*** *a barra de ferramentas (22)* ***com base na posição detectada da*** *barra de ferramentas (22).”*

“20. Método implantado em computador para um maquinário ***caracterizado pelo fato*** *de que compreende uma barra de ferramentas alongada (22) que tem unidades de fileiras (33) presas à mesma,* ***o método para ajustar uma rotação da*** *barra de ferramentas (22)* ***em relação a um*** *elemento de armação alongado (20) baseando-se em um contorno de um campo que o maquinário atravessa, o método compreendendo:*

em ***um controlador (34)****:*

receber *uma indicação de uma* ***primeira mudança de ângulo da*** *barra de ferramentas (22)* ***em relação ao chão****;*

fazer um acionador (32) ***que acopla de maneira pivotante*** *a barra de ferramentas (22) ao elemento de armação (20) se retrair* ***com base na indicação da primeira mudança de ângulo****;*

receber *uma indicação de* ***uma segunda mudança de ângulo da*** *barra de ferramentas (22)* ***em relação ao chão****; e*

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fazer o acionador (32) se estender ***com base na indicação da segunda mudança de ângulo.”***

12. Desta forma, conforme estabelecido pela normativa, o presente pedido trata de um sistema, sistema de controle para um maquinário e aplicador de produto e método implantado em computador para um maquinário, que compreendem as seguintes **CARACTERÍSTICAS TÉCNICAS ESSENCIAIS**:

A) um elemento de armação alongado (20);

B) uma barra de ferramentas alongada (22) acoplada ao elemento de armação (20) por meio de uma junção articulada, a barra de ferramentas (22) orientada paralela ao elemento de armação (20);

C) uma pluralidade de unidades de fileiras (33) acoplada à barra de ferramentas (22);

D) um primeiro sensor (50) configurado para detectar uma posição da barra de ferramentas (22) em relação ao chão; e

E) um acionador (32) acoplado entre o elemento de armação (20) e a barra de ferramentas (22), o acionador (32) configurado para girar a barra de ferramentas (22) em relação ao elemento de armação (20) com base em uma posição detectada da barra de ferramentas (22).

13. Analisando as características técnicas essenciais frente ao estado da técnica, temos:

Documento D1 – US9301439B2

14. **D1** descreve implementos agrícolas para trabalho conectado ao solo, em que se deseja manter a profundidade de trabalho das ferramentas de trabalho acopladas ao implemento, a uma profundidade uniforme (ver coluna 1, linhas 65-67 de **D1**).

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SUMMARY OF THE INVENTION

An object is therefore to provide an improved system for adjusting the working depth or height of an agricultural implement.

15. Portanto, **D1** propõe uma solução para o mesmo problema técnico que o presente pedido busca sanar, conforme descrito no parágrafo [002] do relatório descritivo do presente pedido, a saber, manter as ferramentas de trabalho acopladas ao implemento agrícola a uma mesma profundidade do solo, mesmo quando o implemento se desloca sobre um terreno com planaltos ou voçorocas.

16. Para tanto, a invenção de **D1** prevê um sistema hidráulico compreendendo atuadores hidráulicos (13 e 15) controlados por uma **unidade de controle** (20), em resposta aos sinais gerados pelos sensores de posição (18, 19). Os ditos sensores de posição (18, 19) podem ser sensores de ângulo dispostos em um ou ambos os cilindros hidráulicos (13 e 15).

17. As figuras 4 a 7 de **D1** referem-se ao uso de um sistema hidráulico em uma semeadeira de precisão, em que cilindros hidráulicos (113) são dispostos entre a viga transversal (110) da estrutura do implemento e as unidades de plantio (116) e são controlados por sensores de posição (118, 119).

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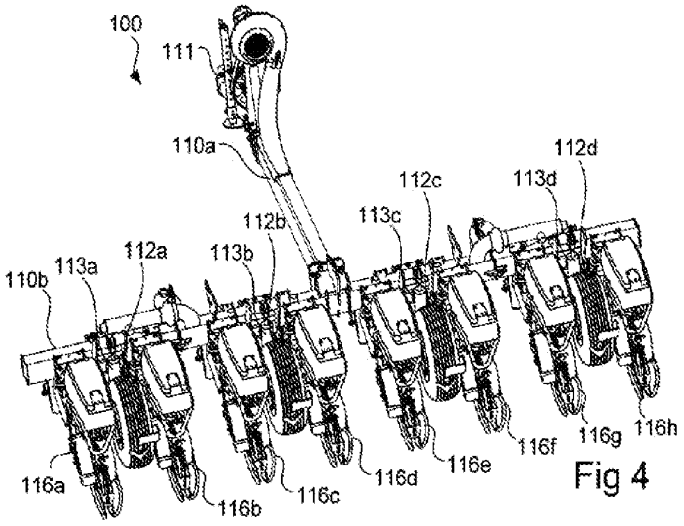


Fig 4

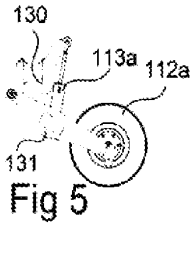


Fig 5

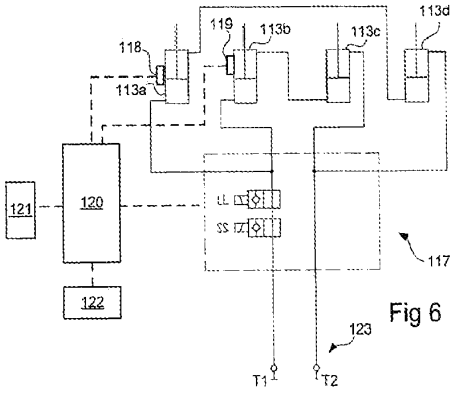


Fig 6

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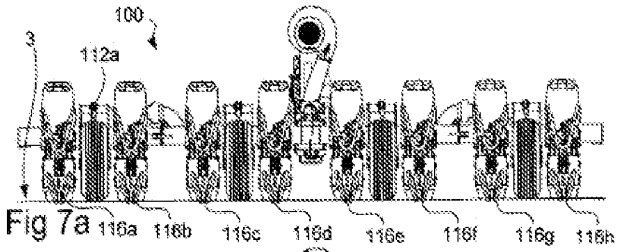


Fig 7a

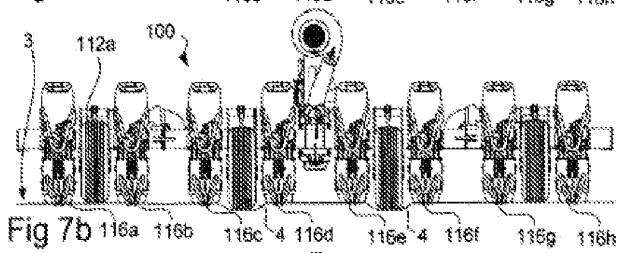


Fig 7b

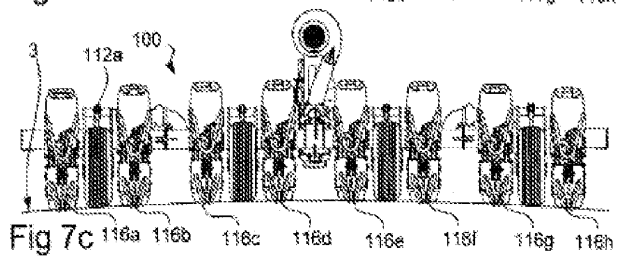


Fig 7c

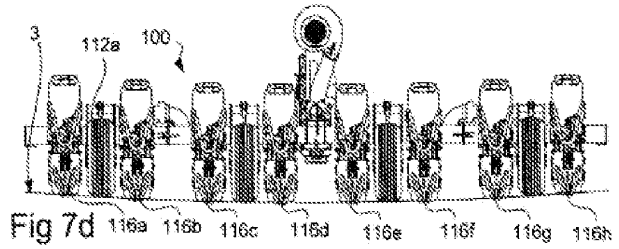


Fig 7d

18. Portanto **D1** já ensina prover um **sistema de controle hidráulico** para implementos agrícolas que funciona através da atuação de **sensores**, assim como descrito no pedido aqui contestado.

19. Isto posto, resta claro que a invenção descrita em **D1** apresenta as **características técnicas** descritas no presente pedido de patente e soluciona o mesmo problema técnico apresentado. Desta forma, **a invenção do presente pedido é antecipada pelos ensinamentos do documento D1.**

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Documento D2 – US2015230391A1

20. O documento **D2** descreve um sistema de plantio que inclui uma pluralidade de conjuntos de linha de semeadura (36), cada uma tendo componentes mantidos em uma elevação controlada, de modo a solucionar o mesmo problema técnico que a presente invenção busca sanar.

21. O documento **D2** foi citado na exigência preliminar 6.23 pelo examinador como sendo um documento impeditivo ao presente pedido, uma vez que a afeta tanto a novidade quanto a atividade inventiva.

22. Em sua manifestação à exigência preliminar, o titular do presente pedido afirma que *"O documento D2 divulga uma unidade de fileira semelhante na FIG. 4, mas não divulga uma barra de ferramentas alongada acoplada à armação por meio de uma junção articulada ou um acionador configurado para girar a barra de ferramentas."*

23. A requerente discorda desta afirmação, visto que **D2** apresenta **uma armação rígida (53) que acopla tanto uma unidade de linha de cultivo (52) de modo pivotante quanto uma barra de ferramentas (34), a qual uma pluralidade de unidades de fileira de plantio (62) é acopladas à barra de ferramentas**.

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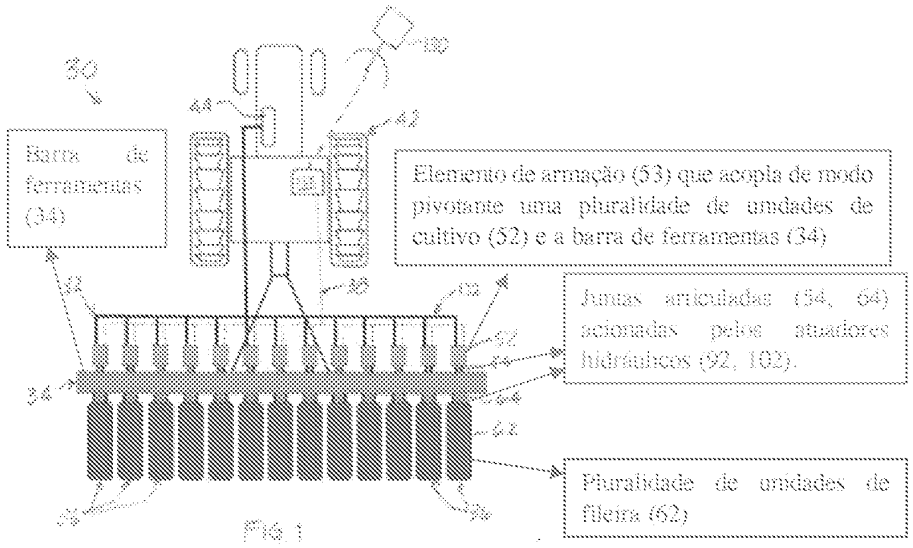


FIG. 1

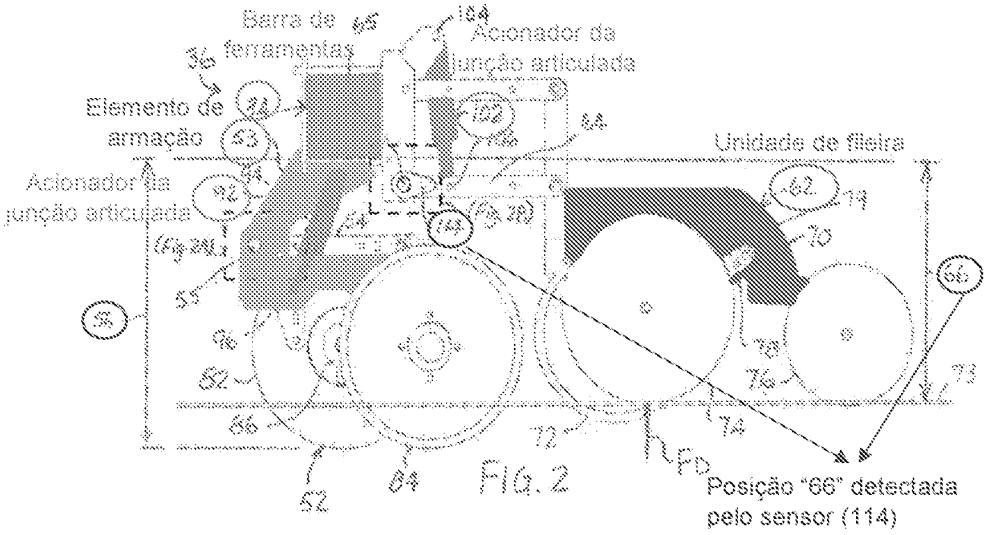


FIG. 2

24. De acordo com **D1**, o sistema revelado pode incluir um atuador de linha de cultivo (92) operacionalmente acoplado entre a barra (34) do implemento e a unidade de fileira de cultivo (52) ou conexão (54), para ajustar a elevação (56) da unidade de fileira de cultivo (52) em relação à barra (34), em que a dita unidade de fileira de cultivo (52) está acoplada à armação do implemento (53).

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"[0028] Each of the seed row assemblies 36 includes a ground engaging attachment or tillage row unit 52 coupled to a rigid frame 53 by a first linkage 54 operatively about a pivot 55, the rigid frame 53 depending from the implement frame 34."

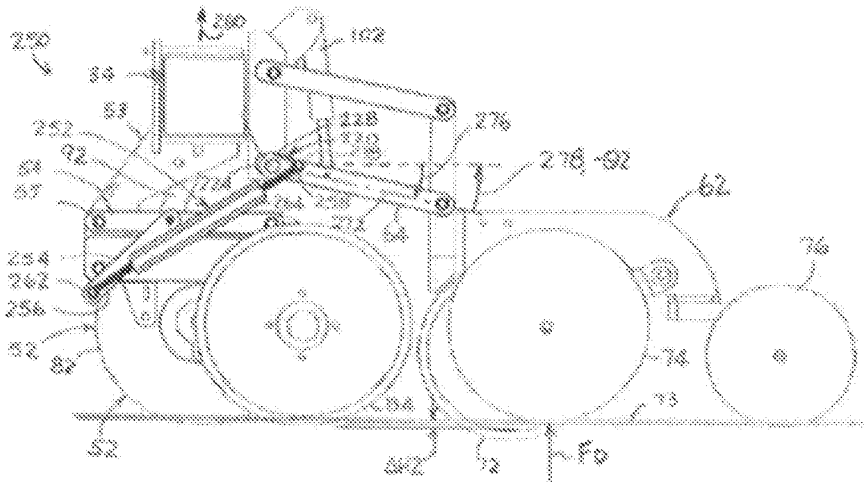
"[0030] Each of the seed row assemblies 36 can further include a tillage row actuator 92 operatively coupled between the implement frame 34 and the tillage row unit 52 or linkage 54, the tillage row actuator 92 including a base portion 94 and a free portion 96, the free portion 96 being translatable relative to the base portion and being operatively coupled with the tillage row unit 52 for adjustment of the elevation 56 of the tillage row unit 52 relative to the implement frame 34."

25. Logo, apesar de a invenção de **D1** diferir do presente pedido por compreender um segundo acionador de junção articulada entre a unidade de fileira de semeadura (62) e a barra de ferramentas (34), este **já antecipa o acionador de junção articulada entre a armação (53) do implemento e a barra de ferramentas (34).**

26. No parágrafo [0033] de **D2,** também é descrito que *"Cada um dos conjuntos de linha de semeadura 36 pode ainda compreender um módulo de detecção de posição 110. Em certas modalidades, o módulo de detecção de posição 110 inclui sensores de posição 112 e 114 operativamente acoplados à primeira conexão 54 e à segunda conexão 64, respectivamente, que emitem sinais 116 e 118, respectivamente, correspondendo à posição detectada. Os sensores de posição 112 e 114 são dispostos para detectar uma rotação angular das respectivas conexões 54 e 64 sobre seus respectivos pivôs 55 e 65, conforme representado neste documento, por exemplo por um potenciômetro giratório."*

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27. O parágrafo [0035] de **D2** descreve que *"Em uma modalidade, os atuadores 92 e 102 são cilindros hidráulicos lineares (conforme representado), que são operativamente acoplados a um circuito de pressão hidráulica 132 que é proveniente, por exemplo, da fonte de pressão hidráulica 44 da unidade de reboque 42. O circuito de pressão hidráulica pode incluir linhas de origem 134 e linhas de retorno 136. Outros tipos de atuadores podem também ser implementados, como atuadores hidráulicos rotacionais, atuadores pneumáticos lineares ou rotacionais e/ou atuadores lineares ou rotacionais movidos por um motor elétrico. Em algumas modalidades, todos os atuadores são do mesmo tipo; outras modalidades utilizam uma mistura de tipos de atuadores."*



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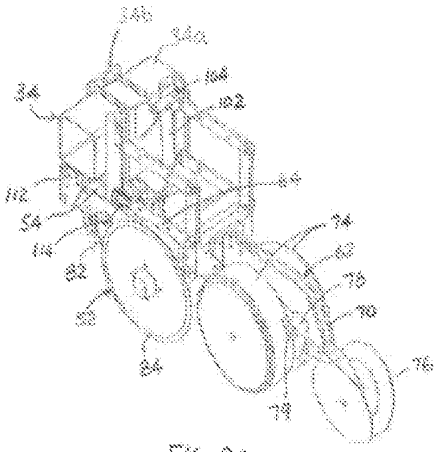


Fig. 2C

28. Portanto, o sistema de plantio descrito em **D2** apresenta um **atuador**, tal como um cilindro hidráulico, que atua para **pivotar a barra de ferramentas com base na posição detectada por sensores de posição em relação ao solo**. O sensor de posição (112) está acoplado à primeira conexão (54) da estrutura (34) e o sensor de posição (114) está acoplado à segunda conexão (64) da estrutura da unidade de linha (52), assim como descrito no pedido aqui contestado.

29. Resta claro que a invenção descrita em **D2** apresenta as **características técnicas** descritas no presente pedido de patente e soluciona o mesmo problema técnico apresentado. Desta forma, **a invenção do presente pedido é antecipada pelos ensinamentos do documento D2.**

Documento D3 – CA2289293

30. O documento **D3** protege um sistema de controle fornecido para implantar automaticamente os marcadores de campo em uma plantadora agrícola de uma maneira alternada, sem a necessidade de intervenção do operador.

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31. O documento **D3** teve um correspondente de sua família (US6112827) citado na exigência preliminar 6.23 pelo examinador como sendo um documento impeditivo ao presente pedido.

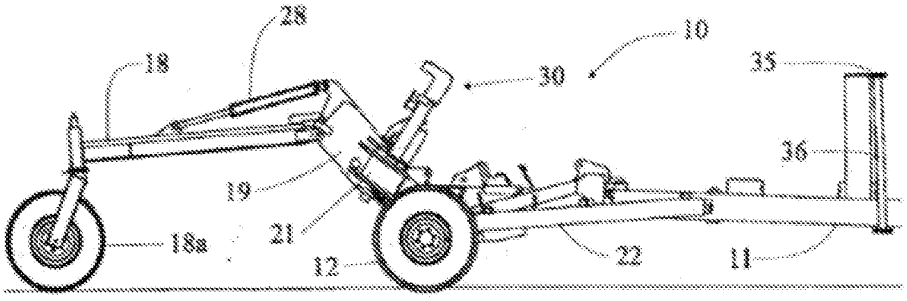
32. Em sua manifestação à exigência preliminar, o titular do presente pedido afirma que *"O documento D3 descreve uma fechadura de transporte para implementos dobráveis. Um sensor de posição de trabalho determina se a barra de ferramentas 15 é dobrada ou abaixada. Ver D3, coluna 13, linhas 49-58. D3 não tem um elemento de armação alongado ou uma barra de ferramentas alongada paralela ao elemento de armação."*

33. A requerente aponta que o documento **D3** descreve na página 12, linhas 3 a 15 que *"Com referência agora às Figs. 1 - 9, um implemento de plantio incorporando os princípios da invenção instantânea, podem ser melhor vistos. Referências à esquerda e à direita são usadas como uma questão de conveniência e são determinadas ficando na parte traseira do implemento voltado para o trator ao qual o implemento será acoplado e, portanto, na direção normal da viagem. Um ténico no assunto perceberá prontamente que o implemento de plantio incorpora* ***uma barra de ferramentas do tipo dobrável que se estende lateralmente para cada lado de uma linha de centro para distâncias de 15 a 30 pés ou mais.*** *Este instrumento de plantio dobrável 10 é fornecido com* ***conjuntos de ala esquerda e direita 20*** *nos quais são montados uma pluralidade de sub-estruturas 18 nas quais são montados dispositivos de lavoura e/ou plantio 19a para trabalhar o terreno e plantar sementes, fertilizantes, etc. conforme o implemento 10 passa sobre o solo. Por para fins de clareza, apenas o conjunto de ala direita 20 é representado nos desenhos em forma esquemática. O conjunto da ala esquerda seria uma imagem espelhada do conjunto da ala direita 20."* (grifo nosso)

34. O sistema de controle descrito em **D3** utiliza um **sensor de proximidade** para determinar se a barra de ferramentas está vindo da posição de trabalho

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abaixada para a posição de cabeceira elevada ou viceversa. Válvulas solenoides no **circuito hidráulico** para os atuadores do marcador de campo são ativadas para retrair ambos os atuadores para retrair o implantado dos marcadores de campo quando a barra de ferramentas é movida para a posição da cabeceira. Quando a barra de ferramentas é retornada à posição de trabalho após fazer uma curva nas cabeceiras do campo, o sistema de controle lembra qual marcador de campo acabou de ser implantado e então estende o outro marcador de campo para pontuar o campo.



35. Portanto, o documento **D3** refere-se a um sistema de controle de um implemento agrícola, que inclui uma estrutura, uma barra de ferramentas acoplada à estrutura e uma pluralidade de unidades de linha acopladas à barra de ferramentas. O sistema de controle utiliza sensores de posição para controlar e determinar a profundidade de operação de uma ferramenta de engate com o solo da barra de ferramentas.

36. Resta claro que a invenção descrita em **D3** apresenta as **características técnicas** descritas no presente pedido de patente e soluciona o mesmo problema técnico apresentado. Desta forma, **a invenção do presente pedido é antecipada pelos ensinamentos do documento D3.**

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Documento D4 – US8573319

37. O documento **D4** descreve um sistema de controle para um implemento agrícola.

38. O documento **D4** foi citado na exigência preliminar 6.23 pelo examinador como sendo um documento impeditivo ao presente pedido, no parecer este documento foi identificado como **D5**.

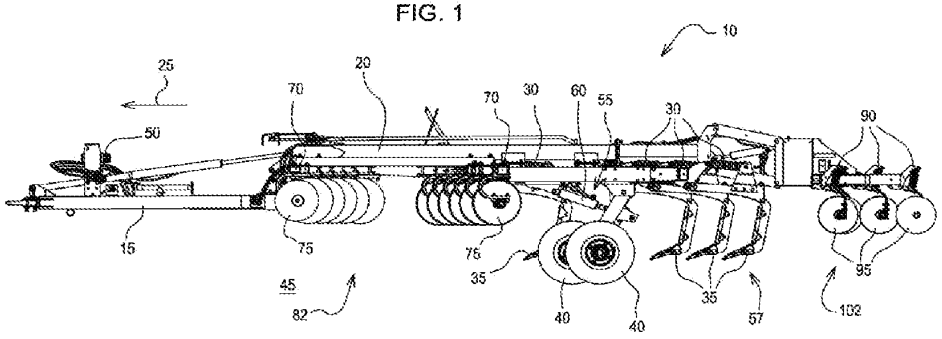
39. Em sua manifestação à exigência preliminar, o titular do presente pedido afirma que *"O documento D5, por sua vez, descreve um sistema de controle para um implemento agrícola que inclui uma primeira seção de armação 20, uma segunda seção de armação 65 e uma terceira seção de armação 85 transportando ferramentas de engate no solo 90. Ver D5, coluna 3, linha 21 a coluna 4, linha 13. Um sensor de posição 130 é configurado para medir a profundidade operacional da ferramenta de engate no solo 90. Ver D5, coluna 4, linha 64 a coluna 5, linha 2. A terceira seção de armação 85 é articuladamente acoplada à primeira seção de armação 20 por uma ligação paralela de modo que sua altura seja controlada por um acionador 300 (ligação paralela não numerada, mas melhor mostrada na FIG. 7). Como a terceira seção de armação 85 está conectada por uma ligação paralela, ela não gira em relação à segunda seção de armação 65. A terceira seção de armação 85, em vez disso, pode ser elevada e abaixada em relação à segunda seção de estrutura 65."*

40. A requerente aponta que o documento **D4** apresenta um sistema de controle para um implemento agrícola que inclui um **sensor de posição** configurado para medir uma indicação de profundidade de uma profundidade operacional real de uma ferramenta de engajamento no solo e configurado para gerar um sinal de posição correspondente. O sistema inclui também um **sensor de pressão** configurado para medir uma indicação de pressão de uma pressão operacional real e configurado para gerar um sinal de pressão correspondente.

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41. **D4** descreve também uma **unidade de controle de implemento** configurada para receber o sinal de posição e o sinal de pressão e configurada para controlar um dispositivo de ajuste de modo que a indicação de profundidade almeje um ponto de ajuste de profundidade que é indicativo da profundidade operacional pré-selecionada, desde que a indicação de pressão esteja dentro de um pré-intervalo de pressão selecionado.

FIG. 1



42. O documento **D4** afirma na coluna 3, linhas 33 a 40 que *"um primeiro dispositivo de ajuste 55 (por exemplo, cilindro hidráulico extensível e retrátil) é acoplado à primeira seção do quadro 20 e aos conjuntos de roda 40. O primeiro dispositivo de ajuste 55 está em comunicação de fluido com o controlador 50 e configurado para elevar e abaixar a primeira seção de estrutura 20 em relação ao solo 45 para mover a primeiro ferramenta 30 entre uma primeira posição de transporte de ferramenta de engate no solo 57 e uma primeira profundidade operacional pré-selecionada 58."*

43. Portanto, o sistema de controle descrito em **D4** apresenta um **atuador**, tal como um cilindro hidráulico, que atua para **movimentar a barra de ferramentas com base na posição detectada por sensores de posição em relação ao solo**.

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44. A requerente entende que a simples mudança de disposição da conexão entre o elemento de armação e a barra de ferramentas do pedido aqui contestado seria **atingida de maneira óbvia por um técnico no assunto, tendo em vista os ensinamentos revelados em D4.**

45. Resta claro que a invenção descrita em **D4** apresenta as **características técnicas** descritas no presente pedido de patente e soluciona o mesmo problema técnico apresentado. Desta forma, **a invenção do presente pedido é antecipada pelos ensinamentos do documento D4.**

46. Ademais, **a combinação dos documentos D1 a D4 levaria um técnico no assunto a atingir a invenção descrita pelo presente pedido**, visto que **todas as características técnicas essenciais** (características **A)** a **E)**) são descritas em **pelo menos um dos documentos D1 a D4.**

47. Face ao acima discutido, tem-se claro que o presente pedido de patente não atende ao critério de atividade inventiva frente aos documentos D1 a D4, posto que todas as características técnicas essenciais à realização da invenção, definidas na sua reivindicação independente 1, já se encontram no estado da técnica.

48. A **reivindicação independente 19**, referente a um sistema de controle para um maquinário e a **reivindicação independente 20**, referente a um método implantado em computador para um maquinário, estão intimamente vinculadas ao sistema definido na **reivindicação 1**, de modo que **o sistema e o método reivindicados também são completamente antecipados pelos documentos D1 a D4**.

49. Adicionalmente, a reivindicação 19 se trata de uma reivindicação independente da mesma categoria que a reivindicação independente 1 (sistema) e **não descreve um conjunto de características alternativas e essenciais à**

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realização da invenção. Portanto, **esta reivindicação não deveria ser independente**, conforme estabelecido no Art. 5° - II da Instrução Normativa 30/2013:

> *"II. cada reivindicação independente deve corresponder a um determinado conjunto de características essenciais à realização da invenção, sendo que somente será admitida mais de uma reivindicação independente da mesma categoria se tais reivindicações definirem diferentes conjuntos de características alternativas e essenciais à realização da invenção, ligadas pelo mesmo conceito inventivo;"*

50. As demais **reivindicações 2 a 18 são dependentes da reivindicação 1**, portanto apenas definem detalhamentos das características essenciais definidas na reivindicação independente e/ou características adicionais não essenciais da invenção, conforme estabelecido no Art. 6º - I da Instrução Normativa 30/2013:

> *"Art. 6º As reivindicações dependentes deverão cumprir as seguintes especificações:*
>
> *I. são aquelas que, mantida a unidade de invenção, incluem todas as características de outra(s) reivindicação(ões) anterior(es) e definem detalhamentos dessas características e/ou características adicionais que não sejam consideradas características essenciais da invenção, devendo conter uma indicação de dependência a essa(s) reivindicação(ões) e a expressão "caracterizado por";"*

51. **Entende-se que as características técnicas presentes na tecnologia de sistema, sistema de controle para um maquinário e método implantado em computador para um maquinário estão compreendidas no estado da técnica através da combinação dos documentos D1 a D4.**

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52. **O documento D2, em especial, antecipa todas as características técnicas essenciais descritas na reivindicação independente 1 do presente pedido, conforme explicitado anteriormente.**

VI - CONCLUSÃO

53. A Requerente ressalta que as **principais características** reivindicadas no pedido BR112019010534-4 estão compreendidas no estado da técnica, quando confrontado com os documentos **D1 a D4**.

54. Ademais, ressaltamos que nenhuma das reivindicações dependentes trazem matéria nova capaz de conferir atividade inventiva ao objeto da invenção, frente aos documentos aqui apresentados.

55. Diante de todo o todo acima exposto, tem-se claro que o presente pedido de patente de invenção **não atende aos critérios de PATENTEABILIDADE**. Conforme acima discutido, um técnico no assunto buscando solucionar o problema de implementos agrícolas possuindo seções longas e rígidas que não operam bem em campos irregulares, como depressões ou planaltos, que comprometem a habilidade das unidades de fileiras de operar adequadamente no campo, obteria o invento proposto, de forma óbvia e sem qualquer necessidade de experimentação, a partir dos ensinamentos dos documentos **D1 a D4.**

Isto posto, comprova-se, claramente a ausência dos requisitos legais, para a concessão do pedido de patente de invenção BR112019010534-4.

Nestes termos, espera a Requerente que seja **INDEFERIDO** o presente pedido patente de invenção, por ser medida de **DIREITO** e mais lídima **JUSTIÇA**.

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JIMER RAMOS DA COSTA
OAB / RJ 57.611

Petição 870220004301, de 17/01/2022, pág. 30/138

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BR 11 2019 010534 4

Third-party submission dated 17/01/2022

English translation by translate.bing.com

JIMER RAMOS DA COSTA, Brazilian, married, CPF 837.515.057-68, OAB/RJ 57,611, duly qualified in the application preceding it, provided that interested in research and development of technologies related to machines and agricultural implements, comes the presence of Mr. Examiner, pursuant to Article 31 of the Industrial Property Act (LPI), submit

TECHNICAL EXAM GRANTS

patent application for invention BR112019010534-4, entitled "Machinery that circumvents toolbar", deposited on 23/05/2019 on behalf of AGCO CORPORATION, as it does not meet the requirements of patentability, and should be rejected in its integrity, for the reasons brought to the exam.

I - TIMING:

1. As set out in Article 31 of Industrial Property Law No. 9,279 of May 14, 1996 (LPI), JIMER RAMOS DA COSTA comes, in legitimate present documents and information to support the examination of the patent in question.

"... If the patent application has been published and by the end of the examination, provided for the submission by interested parties of documents and information to support the examination."

II - PATENT APPLICATION BR112019010534-4:

2. The present application concerns a system with a frame element (20), a toolbar (22) coupled to that frame element by means of an articulated joint parallel to the frame element; a row unit coupled to the toolbar, a sensor (50) to detect the position of the toolbar relative to the floor, and a trigger coupled between the frame element and the toolbar to handle the toolbar containing the so-called row unit in relation to the frame element based on the position of the toolbar relative to the floor, detected by the said sensor.

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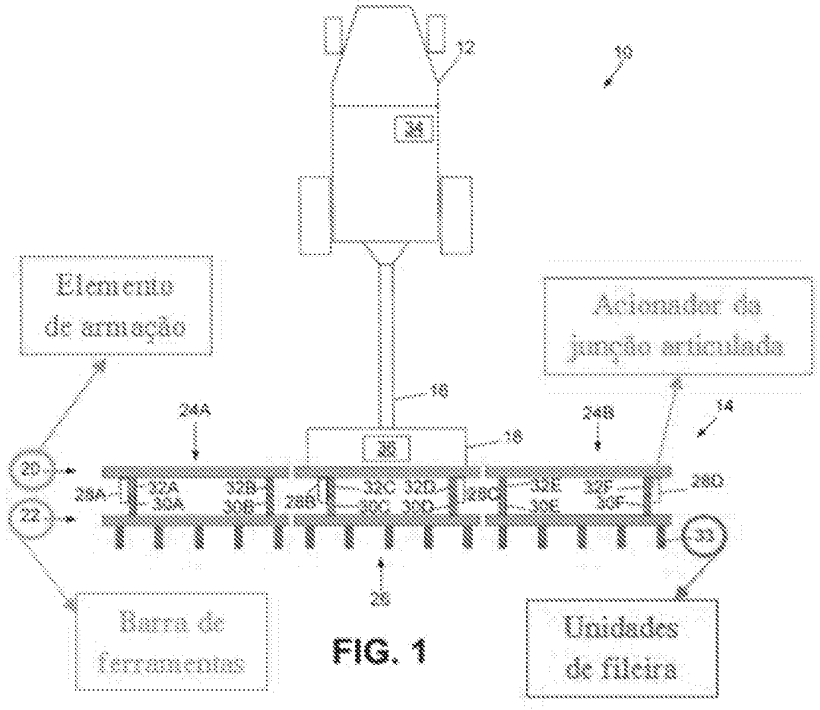
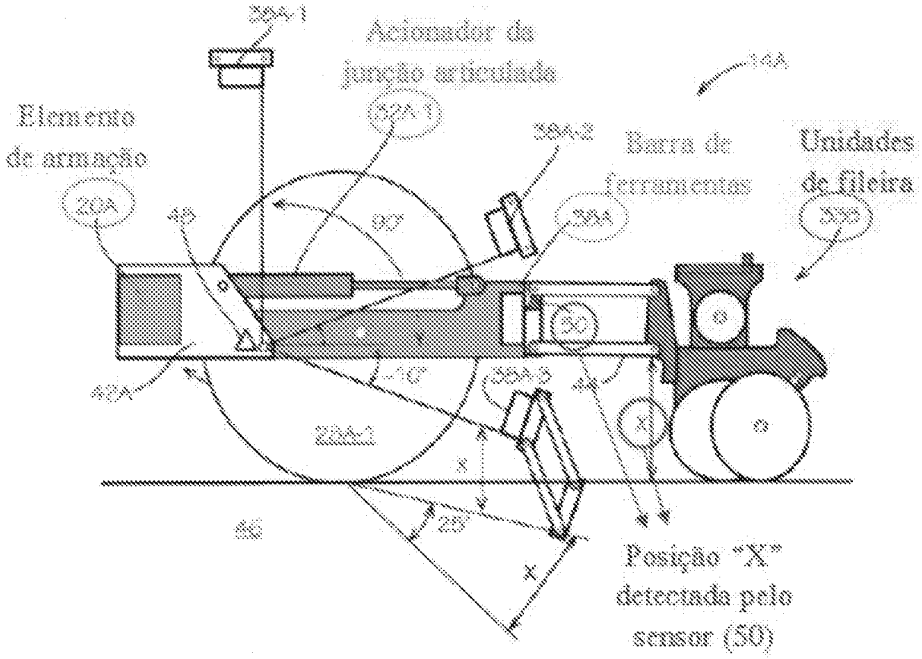


FIG. 1



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III - PATENTABILITY REQUIREMENTS:

3. In accordance with Industrial Property Law No. 9,279 of May 14, 2011, 1996 (LPI), Article 8, "The invention that meets the requirements of inventive activity and industrial application."

4. For the purposes of this law, the invention is endorsed with novelty when it is not understood in the state of the art, as set out in Article 11 and inventive activity where, for a technician in the subject, it does not sum up obvious or obvious manner of the state of the art, in accordance with Article 13.

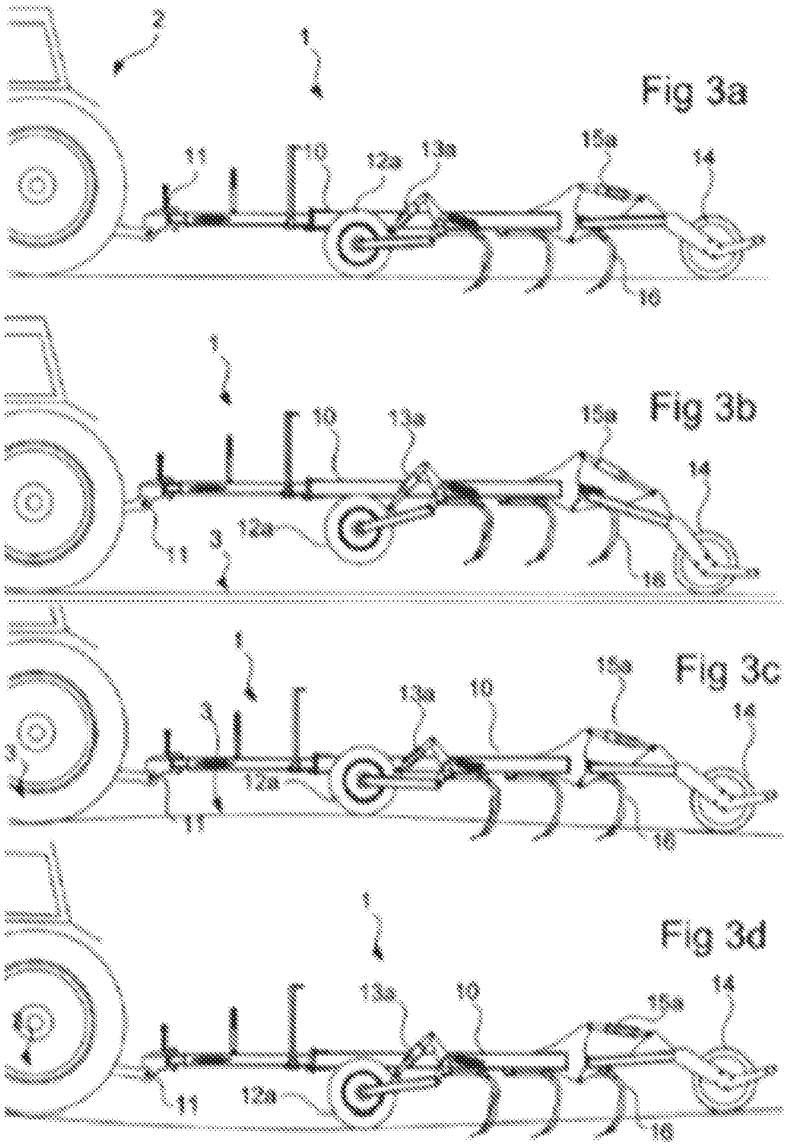
5. This said, the Applicant hereby clarify that the application in question, at least, DOES NOT INVOLVE INVENTIVE ACTIVITY in the face of the state of the technique known at the time of its filing. Therefore, the present application for invention patent does not comply with the provisions of Articles 8 c/c 13 of the LPI, as will be apparent from the analysis of the documents brought here, which prevent the granting of the application in vogue here. IV - STATE OF THE ART DOCUMENTS:

6. The documents below belong to the state of the art, as they have been published on a date prior to the filing date of the application for an invention patent BR112019010534-4 and were relevant regarding the inventive activity of this patent.

D1: US9301439B2 – Agricultural implement and method for controlling an agricultural implement – published 05/04/2016.

D1 describes an agricultural implement for working the soil, through which the agricultural implement travels or is towed, includes a structure, a first depth maintenance unit, including a first hydraulic actuator to adjust the height of the first depth maintenance unit in relation to the structure, a second depth maintenance unit, including a second hydraulic actuator to adjust the height of the second depth maintenance unit relative to the structure, at least one ground work tool and one hydraulic system including hydraulic actuators configured to be connected to a hydraulic fluid supply mechanism to the hydraulic system. A first side of the first hydraulic actuator communicates with a first side of the second hydraulic actuator and a measuring mechanism configured to provide a measured value corresponding to a first amount of hydraulic fluid occurring on the said first sides.

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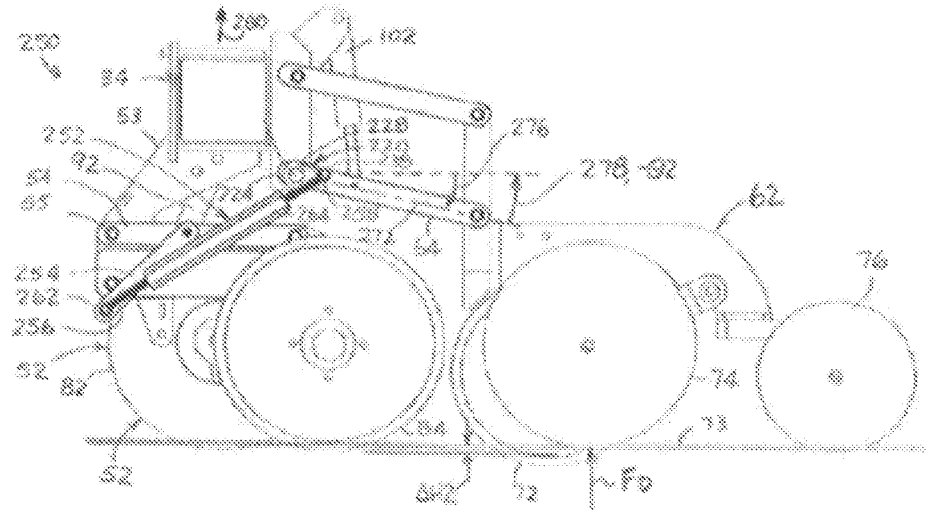


The following documents were cited in the preliminary requirement opinion published under Order 6.23, in the Industrial Property Journal No. 2644 of 08/09/2021, to which the Applicant submitted through petition No. 870210111916 on 02/12/2021, alleging, in a superficial manner, that such documents do not teach "an elongated toolbar coupled to the frame by means of an articulated joint or a trigger configured to rotate the toolbar." In the meantime, we hope that such a claim will be refuted, since, as shown below, the documents below already teach the technical characteristics claimed as new and inventive in the patent application.

D2: US2015230391A1 - Depth control for a seed planting system – published 20/08/2015.

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The planting system described in D2 includes a plurality of line sets each having components maintained at a controlled elevation. The sowing line set includes a cultivation line unit controlled to maintain a desired elevation relative to a line unit sowing, the sowing line unit being configured to follow passively the local terrain. Each set of sowing lines can include two position sensors that generate signals corresponding to the elevation of the unit sowing line and the ground coupling attachment, respectively, or a sensor position that generates signals corresponding to the difference in elevations. Several modes include a local closed circuit controller that adjusts the elevation of the cultivation line unit in relation to the line unit of sowing to a desired set point. In some modalities, the strength descending from the sowing line unit is actively controlled.



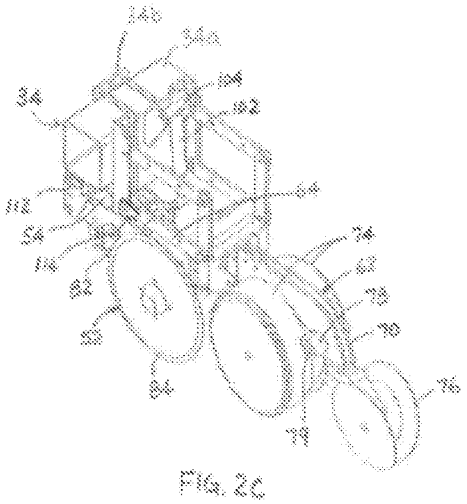
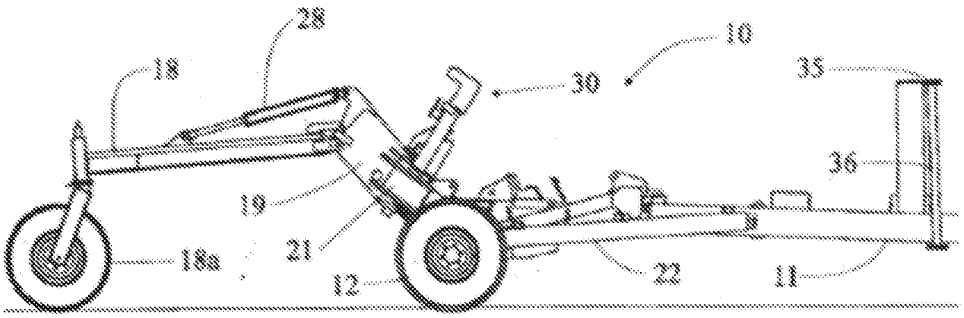


Fig. 2c

D3: CA2289293A1 – Field marker control system for agricultural planters – published 20/01/2009.

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Document D3 describes a control system provided to deploy field markers on an agricultural planter of a without the need for operator intervention. The system of control uses a proximity sensor to determine whether the control bar tools is coming from the lowered working position to the bedside position high or vice versa. Solenoid valves in the hydraulic circuit for actuators the field marker are activated to retract both actuators to retract the deployed from the field markers when the toolbar is moved to the headboard position. When the toolbar is returned to the after making a curve at the headboards of the field, the control system remembers which field marker has just been deployed and then extends the other field marker to score the field. The control system allows the operator be aware of the tractor's turning and implement in the headboards and the fixing of planting in the soil in an appropriate place for planting the crop.

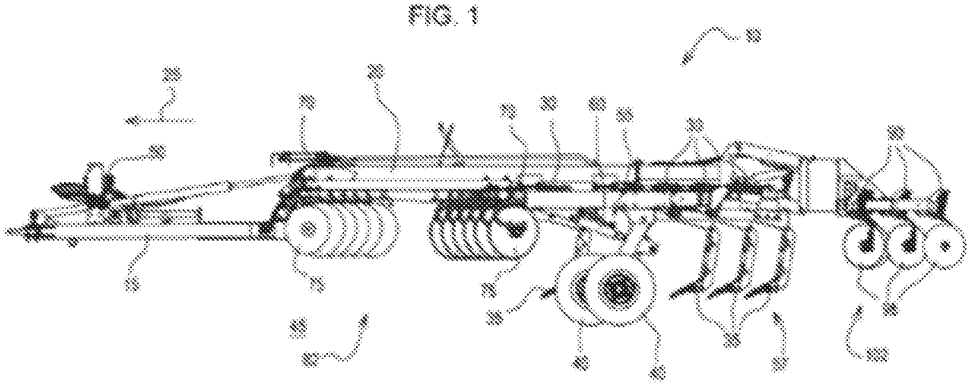


D4: US8573319B1 – Position and pressure depth control system for an agricultural implement – published 05/11/2013.

The invention described in D4 reveals a control system for an implement agricultural. The control system includes a position sensor configured to measure a depth indication of a real operational depth of a ground engagement tool and configured to generate a position signal corresponding. A pressure sensor configured to measure an indication of pressure of a real operating pressure and configured to generate a signal of corresponding pressure. An implement control unit configured to receive the position signal and the pressure signal and configured to control a adjustment device so that the depth indication is a point of depth adjustment that is indicative of the preselected operating depth, provided that the pressure indication is within a pre-range of pressure selected.

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FIG. 1



V - THE ABSENCE OF INVENTIVE ACTIVITY OF THE REQUEST BR112019010534-4

7. In its Descriptive Report, the document that is refuted here cites in its paragraph [002] that current agricultural implements have long and rigid sections that do not operate well in irregular fields, such as depressions or plateaus that compromise the ability of row units to operate properly in the field. As an example, when a planter comes across a plateau, the wheel frame suspends the row units to the point of suspending them from the ground. On the other hand, as the wheels descend through the rear of the plateau, the entire weight of the frame rests on the row units. In both cases, possible harmful results include insufficient crop yield due to the depth at which seeds are planted, too shallow or too deep.

8. In order to propose a solution to the problem of the state of the art pointed out, application BR112019010534-4 describes a frame element, a tools coupled to said frame element, the toolbar is parallel and at the rear of the frame element; row units coupled to the bar tools. The rotation of the toolbar containing the row units is controlled by a sensor coupled to the toolbar, configured to detect a position of the toolbar relative to the ground; and a trigger coupled between the frame element and the toolbar, configured to rotate the toolbar relative to the frame element based on a detected position of the toolbar.

9. In accordance with Article 5, items I and II of Normative Instruction No. 30, the Independent Claims Must Protect Technical Characteristics essential to the realization of the invention.

<image of citation to law>

10. It must also be considered that the present patent application was the subject of a preliminary requirement (Order 6.23), published in RPI 2644 of 09/08/2021. The holder of the application presented a statement to this requirement through the 870210111916 application of 02/12/2021, in which he presented new avenues of the Descriptive Report, Claims and Summary.

11. Therefore, according to the new framework submitted by the holder, this patent application proposes a system, a control system for a machinery and a computer-implanted method for a machinery, the technical characteristics of which defined in its independent Claims 1, 19 and 20 are the particular characteristics necessary to solve the problem of the state of the above mentioned technique. With this, we have that Claims 1, 19 and 20 define:

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<claim language>

12. Thus, as established by the regulations, the present application deals with a system, control system for a machinery and application of product and method implanted in computer for a machinery, which comprise the following ESSENTIAL TECHNICAL CHARACTERISTICS:

A) an elongated frame element (20);

B) an elongated toolbar (22) coupled to the frame element (20) by means of an articulated joint, the toolbar (22) oriented parallel to the frame element (20);

C) a plurality of row units (33) coupled to the toolbar (22);

D) a first sensor (50) configured to detect a toolbar position (22) relative to the floor; and

E) a trigger (32) coupled between the frame element (20) and the toolbar (22), the trigger (32) configured to rotate the toolbar (22) relative to the frame element (20) based on a detected position of the toolbar (22).

13. Analyzing the essential technical characteristics in the face of the state of the art, we have:

Document D1 – US9301439B2

14. D1 describes agricultural implements for ground-connected work, where the working depth of the work tools coupled to the implement is desired, at a uniform depth (see column 1, rows 65-67 of D1).

<image of D1 text>

15. Therefore, D1 proposes a solution to the same technical problem as this application seeks to solve, as described in paragraph [002] of the descriptive report of this application, namely to keep the work tools coupled to the agricultural implement at the same depth of the ground, even when the implement moves on a ground with plateaus or gullies.

16. To this do so, the invention of D1 provides for a hydraulic system comprising hydraulic actuators (13 and 15) controlled by a control unit (20), in response to the signals generated by the position sensors (18, 19). The so-called position sensors (18, 19) can be angle sensors arranged in one or both hydraulic cylinders (13 and 15).

17. Figures 4 to 7 of D1 refer to the use of a hydraulic system in a precision sower, in which hydraulic cylinders (113) are arranged between the transverse beam (110) of the implement structure and the planting units (116) and are controlled by position sensors (118, 119).

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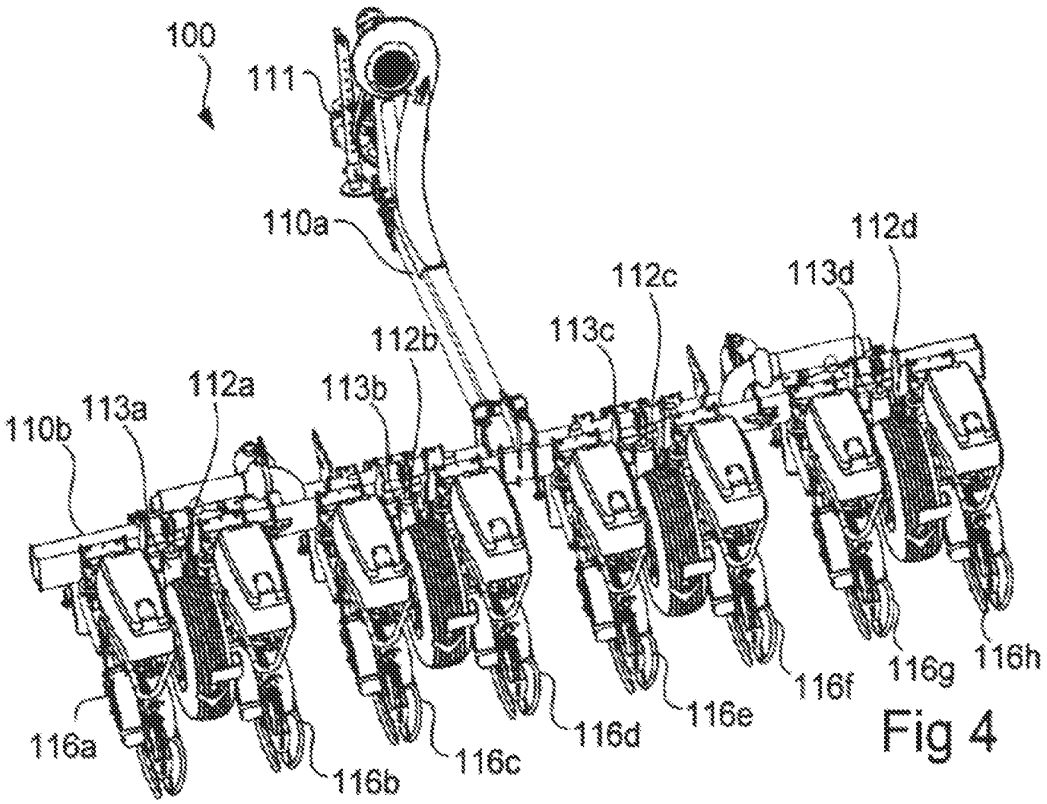


Fig 4

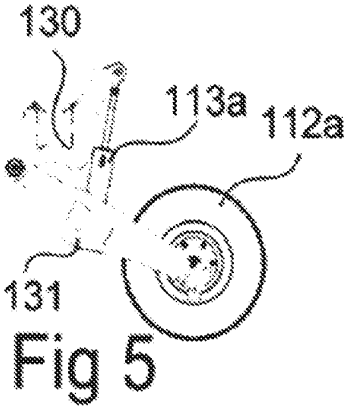


Fig 5

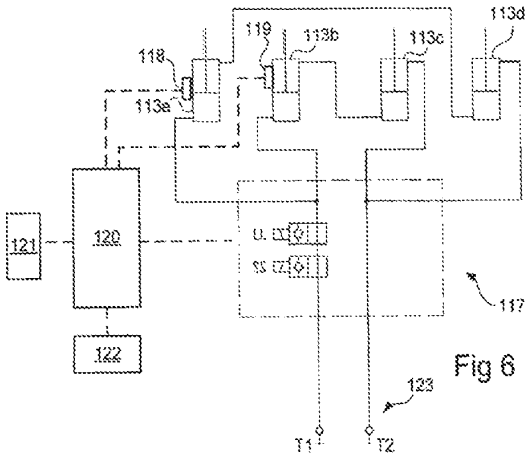


Fig 6

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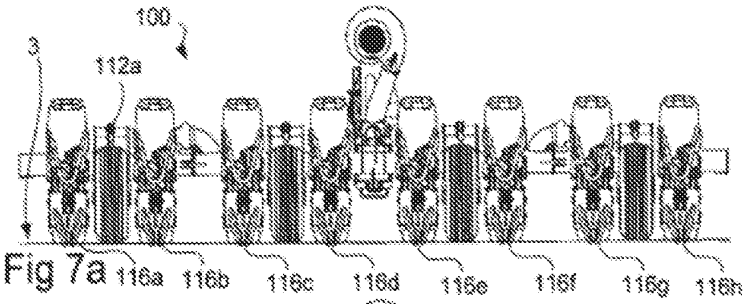


Fig 7a

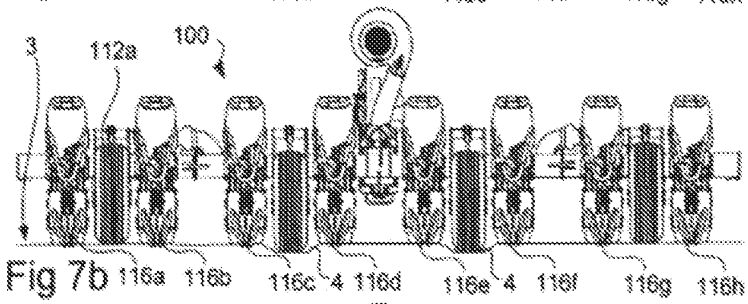


Fig 7b

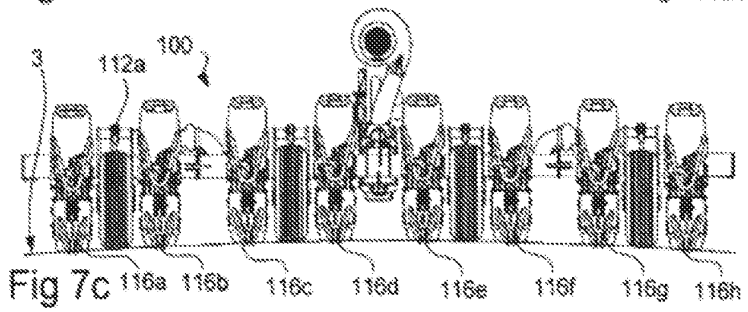


Fig 7c

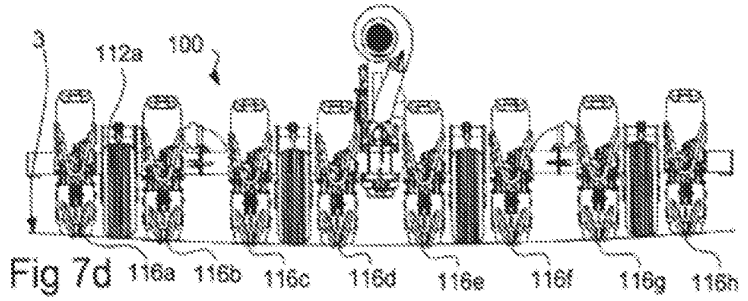


Fig 7d

18. Therefore D1 already teaches to provide a hydraulic control system for agricultural implements that works through the operation of sensors, as described in the request disputed here.

19. As a matter of view, it remains clear that the invention described in D1 presents the technical characteristics described in this patent application and solves the same technical problem presented. In this way, the invention of this application is anticipated by the teachings of document D1.

Document D2 – US2015230391A1

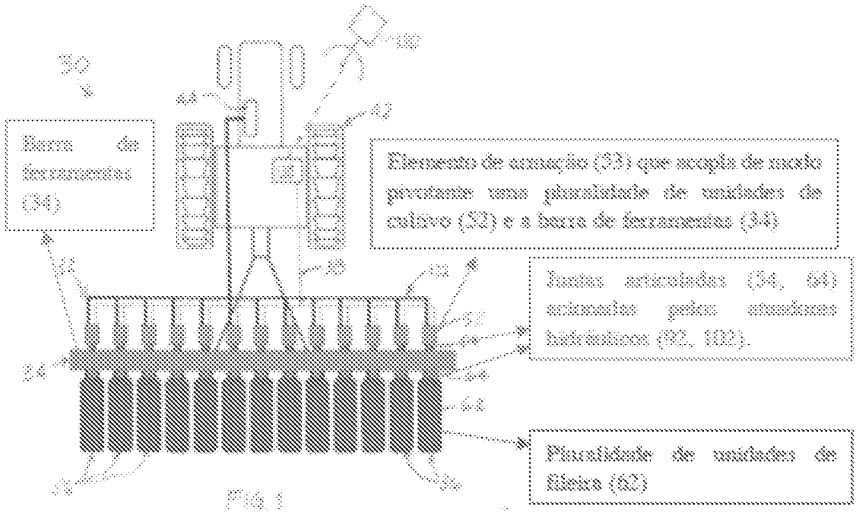
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20. Document D2 describes a planting system that includes a plurality of sowing line sets, (36) each having components maintained at a controlled elevation, in order to solve the same technical problem that the present invention seeks to remedy.

21. Document D2 was cited in preliminary requirement 6.23 by the examiner as an impediment document to the present application, since it affects both novelty and inventive activity.

22. In its manifestation to the preliminary requirement, the holder of this application states that "Document D2 discloses a similar row unit in FIG. 4, but does not disclose an elongated toolbar attached to the frame by means of an articulated joint or a trigger configured to rotate the toolbar."

23. The applicant disagrees with this assertion, since D2 presents a rigid frame (53) that attaches both a unit of cultivation line (52) in a pivoting way and a toolbar (34), to which a plurality of planting row units (62) is coupled to the toolbar.



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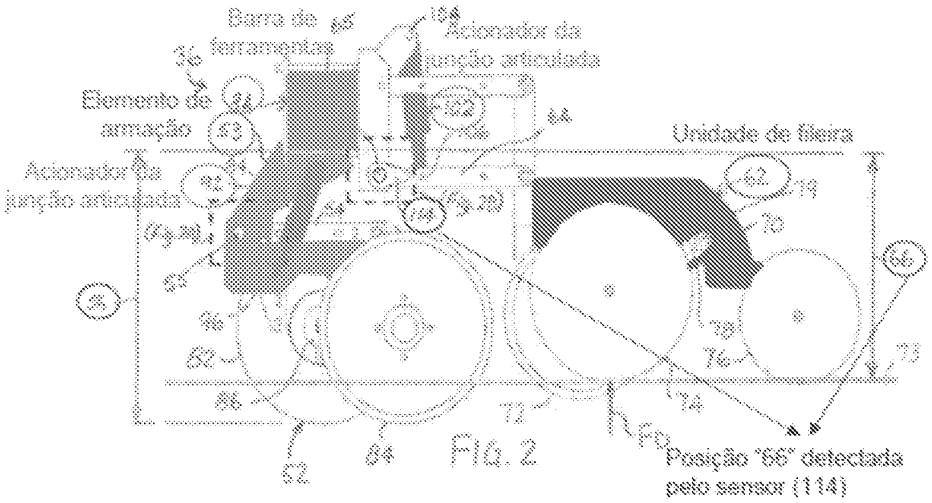


FIG. 2

24. According to D1, the system revealed may include a cultivation line actuator (92) operationally coupled between the implement bar (34) and the cultivation row unit (52) or connection (54), to adjust the elevation (56) of the cultivation row unit (52) in relation to the bar (34), in which the said cultivation row unit (52) is attached to the implementation frame (53).

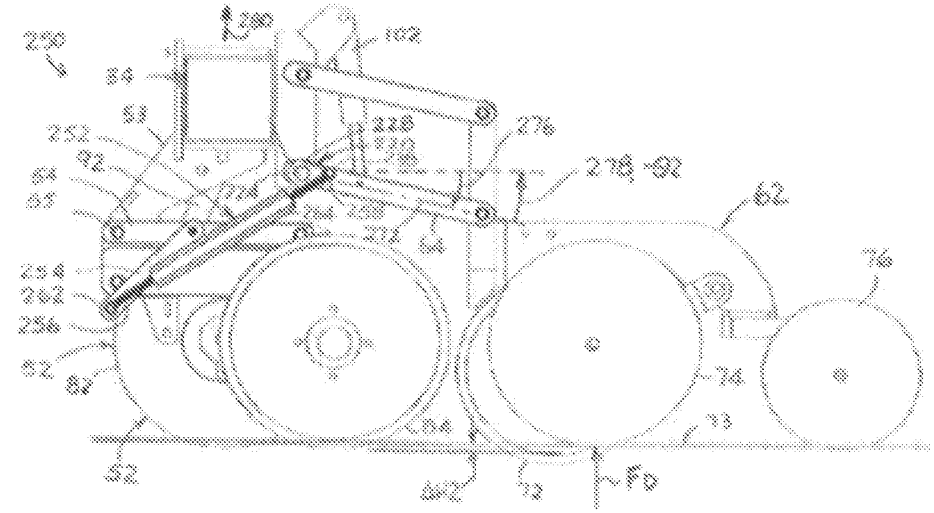
> "[0028] Each of the seed row assemblies 36 includes a ground engaging attachment or tillage row unit 52 coupled to a rigid frame 53 by a first linkage 54 operatively about a pivot 55, the rigid frame 53 depending from the implement frame 34."
>
> "[0030] Each of the seed row assemblies 36 can further include a tillage row actuator 92 operatively coupled between the implement frame 34 and the tillage row unit 52 or linkage 54, the tillage row actuator 92 including a base portion 94 and a free portion 96, the free portion 96 being translatable relative to the base portion and being operatively coupled with the tillage row unit 52 for adjustment of the elevation 56 of the tillage row unit 52 relative to the implement frame 34."

25. Therefore, although the invention of D1 differs from the present request by understanding a second articulated junction trigger between the sowing row unit (62) and the toolbar (34), it already anticipates the joint trigger articulated between the implement frame (53) and the toolbar (34).

26. In paragraph [0033] of D2, it is also described that "Each of the sowing line sets 36 may also comprise a position detection module 110. In certain modalities, position 110 detection module includes position sensors 112 and 114 operated by the first connection 54 and the second connection 64, respectively, that emit signals 116 and 118, respectively, corresponding to the detected position. Position sensors 112 and 114 are arranged to detect an angular rotation of their respective connections 54 and 64 over their respective pivots 55 and 65, as represented in this document, for example by a rotary pot."

27. Paragraph [0035] of D2 describes that "In a mode, actuators 92 and 102 are linear hydraulic cylinders (as represented), which are operatively coupled to a hydraulic pressure circuit 132 which comes, for example, from the hydraulic pressure source 44 of the towing unit 42. The hydraulic pressure circuit can

include 134 source lines and 136 return lines. Other types of actuators may also be implemented, such as rotational hydraulic actuators, linear or rotational pneumatic actuators and/or linear or rotational actuators driven by an electric motor. In some modalities, all actuators are of the same type; other modalities use a mixture of types of actuators."



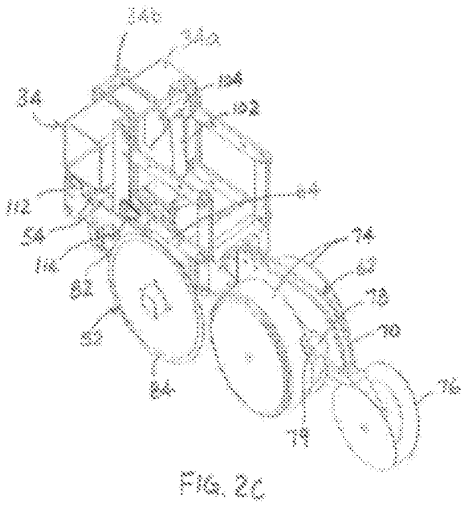


FIG. 2C

28. Therefore, the planting system described in D2 features an actuator, such as a hydraulic cylinder, which acts to pivot the toolbar based on the position detected by position sensors in relation to the ground. The position sensor (112) is coupled to the first connection (54) of the structure (34) and the position sensor (114) is coupled to the second connection (64) of the line unit structure (52), as described in the disputed request here.

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29. It remains clear that the invention described in D2 presents the technical characteristics described in this patent application and solves the same technical problem presented. In this way, the invention of this application is anticipated by the teachings of document D2.

Document D3 – CA2289293

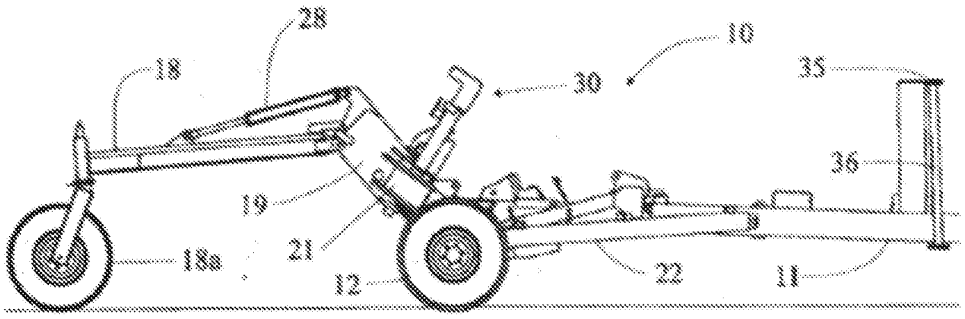
30. Document D3 protects a provided control system to automatically deploy field markers to an agricultural planter alternately, without the need for operator intervention.

31. Document D3 had a correspondent from his family (US6112827) cited in preliminary requirement 6.23 by the examiner as being a document preventing the present application.

32. In its statement to the preliminary requirement, the holder of this application states that "Document D3 describes a transport lock for folding implements. A working position sensor determines whether toolbar 15 is folded or lowered. See D3, column 13, rows 49-58. D3 does not have an elongated frame element or an elongated toolbar parallel to the frame element."

33. The applicant points out that document D3 describes on page 12, lines 3 to 15 that "With reference now to Figs. 1 - 9, a planting implement incorporating the principles of instant invention, can be better seen. Left and right references are used as a matter of convenience and are determined by staying at the rear of the tractor-facing implement to which the implement will be coupled and therefore in the normal direction of travel. A tapered on the subject will readily notice that the planting implement incorporates a folding-type toolbar that extends laterally to each side of a centerline for distances of 15 to 30 feet or more. This folding planting instrument 10 is supplied with left and right wing sets 20 in which a plurality of substructures 18 are assembled in which 19a crop and/or planting devices are assembled to work the land and plant seeds, fertilizers, etc. as implement 10 passes over the soil. For clarity, only the right wing set 20 is represented in the drawings in a squematic form. The left wing assembly would be a mirror image of the right wing 20 assembly." (our griffin)

34. The control system described in D3 uses a proximity sensor to determine whether the toolbar is coming from the lowered working position to the raised or vice versa headboard position. Solenoid valves in the hydraulic circuit for field marker actuators are activated to retract both actuators to retract the implanted from the field markers when the toolbar is moved to the headboard position. When the toolbar is returned to the working position after making a curve at the field headboards, the control system remembers which field marker has just been deployed and then extends the other field marker to score the field.



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35. Therefore, document D3 refers to a control system of an agricultural implement, which includes a structure, a toolbar coupled to the structure and a plurality of line units coupled to the toolbar. The control system uses position sensors to control and determine the operating depth of a tool coupling with the ground of the toolbar.

36. It remains clear that the invention described in D3 presents the technical characteristics described in this patent application and solves the same technical problem presented. In this way, the invention of this application is anticipated by the teachings of document D3.

Document D4 – US8573319

37. Document D4 describes a control system for an agricultural implement.

38. Document D4 was cited in preliminary requirement 6.23 by the examiner as being a document preventing the present application, in the opinion this document was identified as D5.

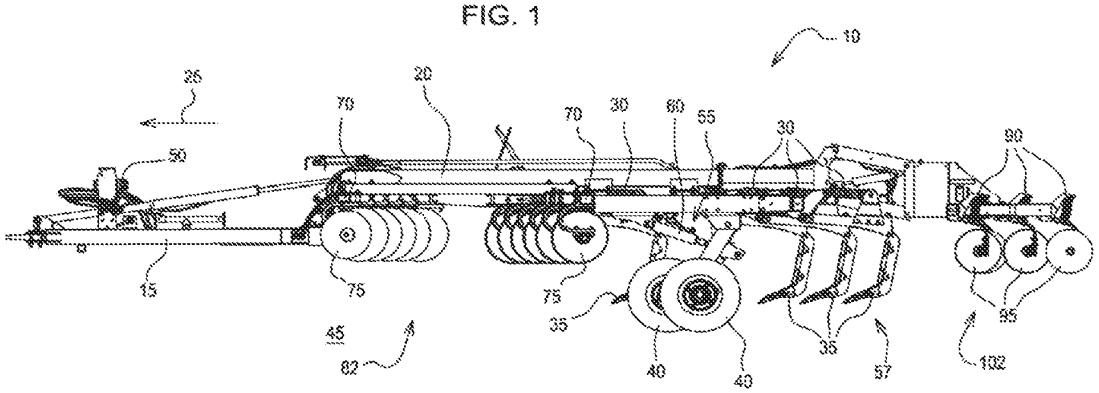
39. In his statement to the preliminary requirement, the holder of this application states that "Document D5, in turn, describes a control system for an agricultural implement that includes a first section of frame 20, a second section of frame 65 and a third section of frame 85 carrying coupling tools on the ground 90. See D5, column 3, row 21, column 4, row 13. A 130 position sensor is configured to measure the operating depth of the coupling tool on ground 90. See D5, column 4, row 64, column 5, row 2. The third section of frame 85 is articulated coupled to the first section of frame 20 by a parallel connection so that its height is controlled by a 300 trigger (unnumbered parallel link, but best shown in FIG. 7). Because the third section of frame 85 is connected by a parallel link, it does not rotate relative to the second section of frame 65. The third section of frame 85 can instead be raised and lowered from the second section of structure 65."

40. The applicant points out that document D4 presents a control system for an agricultural implement that includes a position sensor configured to measure a depth indication of a real operational depth of a ground engagement tool and configured to generate a corresponding position signal. The system also includes a pressure sensor configured to measure a pressure indication of a real operating pressure and configured to generate a corresponding pressure signal.

41. D4 also describes an implement control unit configured to receive the position signal and pressure signal and configured to control an adjustment device so that the depth indication measures a depth adjustment point that is indicative of the pre-selected operating depth, provided that the pressure indication is within a selected pressure preinterval.

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FIG. 1



42. Document D4 states in column 3, lines 33 to 40 that "a first adjustment device 55 (e.g. extendable and retractable hydraulic cylinder) is coupled to the first section of frame 20 and wheel assemblies 40. The first 55 adjustment device is in fluid communication with controller 50 and configured to raise and lower the first section of structure 20 relative to ground 45 to move the first 30 tool between a first coupling tool transport position on the ground 57 and a first pre-selected operating depth 58."

43. Therefore, the control system described in D4 features an actuator, such as a hydraulic cylinder, which acts to move the toolbar based on the position detected by position sensors in relation to the ground.

44. The applicant considers that the mere change of layout of the connection between the frame element and the toolbar of the application disputed here in question would be achieved in an obvious way by a technician in the subject, in view of the lessons revealed in D4.

45. It remains clear that the invention described in D4 presents the technical characteristics described in this patent application and solves the same technical problem presented. In this way, the invention of this application is anticipated by the teachings of document D4.

46. Furthermore, the combination of documents D1 to D4 would lead a technician in the subject to achieve the invention described in the present application, since all the essential technical characteristics (characteristics A) to E)) are described in at least one of the documents D1 to D4.

47. In view of the above, it is clear that the present patent application does not meet the criterion of inventive activity in relation to documents D1 to D4, since all the technical characteristics essential to the realization of the invention, defined in its independent claim 1, are already in the state of the art.

48. Independent claim 19, referring to a control system for a machinery and the independent claim 20, referring to a computer-implanted method for a machinery, are closely linked to the system defined in claim 1, so that the system and method claimed are also fully anticipated by documents D1 to D4.

49. Additionally, claim 19 is an independent claim of the same category as independent claim 1 (system) and does not describe a set of alternative and essential characteristics to the realization of the

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invention. Therefore, this claim should not be independent, as set out in Article 5 - II of Normative Instruction 30/2013:

> "II. each independent claim must correspond to a certain set of characteristics essential to the realization of the invention, and more than one independent claim of the same category shall be admitted only if such claims define different sets of alternative and essential characteristics to the realization of the invention, linked by the same inventive concept;"

50. Other claims 2 to 18 are dependent on claim 1, therefore they only define details of the essential characteristics defined in the independent claim and/or additional non-essential characteristics of the invention, as set forth in Art. 6 - I of Normative Instruction 30/2013:

> "Art. 6 º Dependent claims must comply with the following specifications:
>
> I. are those that, maintained the unit of invention, include all the characteristics of another claim(s) previous(s) and define details of these characteristics and/or additional characteristics that are not considered essential characteristics of the invention, and must contain an indication of dependence on this claim(s) and the expression "characterized by";"

51. It is understood that the technical characteristics present in system technology, control system for a machinery and computer-implanted method for a machinery are understood in the state of the art by combining documents D1 to D4.

52. Document D2, in particular, anticipates all the essential technical characteristics described in independent claim 1 of this application, as explained above.

VI - CONCLUSION

53. The Applicant points out that the main characteristics claimed in application BR112019010534-4 are understood in the state of the art when confronted with documents D1 to D4.

54. Moreover, we emphasize that none of the dependent claims bring new material capable of conferring inventive activity to the object of the invention, in front of the documents presented here.

55. In view of all the above, it is clear that the present application for patent invention does not meet the criteria of PATENTABILITY. As discussed above, a technician in the subject seeking to solve the problem of agricultural implements having long and rigid sections that do not operate well in irregular fields, such as depressions or plateaus, which compromise the ability of the row units to operate properly in the field, would obtain the proposed invention, in an obvious way and without any need for experimentation, from the teachings of documents D1 to D4.

This is clearly proven to be the absence of legal requirements for the granting of the invention patent application BR112019010534-4.

Accordingly, the Applicant expects the present patent application of invention to be rejected, as it is a measure of LAW and more livid JUSTICE.

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Electronic Patent Application Fee Transmittal

Application Number:	16470472
Filing Date:	17-Jun-2019
Title of Invention:	IMPLEMENT CONTOURING TOOLBAR
First Named Inventor/Applicant Name:	Benjamin Anson Fanshier
Filer:	Linda Blankenship
Attorney Docket Number:	US16/40/WO/US-2

Filed as Large Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
NOTICE OF APPEAL	1401	1	840	840
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Extension - 1 month with $0 paid	1251	1	220	220
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	1806	1	260	260
		Total in USD ($)		**1320**

Electronic Acknowledgement Receipt	
EFS ID:	45001465
Application Number:	16470472
International Application Number:	
Confirmation Number:	1653
Title of Invention:	IMPLEMENT CONTOURING TOOLBAR
First Named Inventor/Applicant Name:	Benjamin Anson Fanshier
Customer Number:	88988
Filer:	Linda Blankenship
Filer Authorized By:	
Attorney Docket Number:	US16/40/WO/US-2
Receipt Date:	15-FEB-2022
Filing Date:	17-JUN-2019
Time Stamp:	14:54:39
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$1320
RAM confirmation Number	E20222EE55043244
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Notice of Appeal Filed	US1640WO-US_PreAppealBriefRequest_aia0033.pdf	229547 5ae4ed98347bfdb4cd4dcdea4799194a62d74253	no	2
Warnings:					
Information:					
2	Notice of Appeal Filed	US1640WO-US_Pre-appeal_brief_Filed.pdf	530431 2fec51a9a0ce77afb3d034d03260460b86a751c6	no	5
Warnings:					
Information:					
3	Notice of Appeal Filed	US1640WO-US_NoticeofAppealaia0031.pdf	252464 32ca00ca173de3238dc31862c73f2136f71e19b6	no	2
Warnings:					
Information:					
4	Extension of Time	US1640WO-US_PetitionforExtension_aia0022.pdf	165668 8e57749ac80a31074d1229a6b5d3e5334c5df253	no	2
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Information:					
5	Information Disclosure Statement (IDS) Form (SB08)	US1640WO-US_SUPP_IDS_BR_3rdParty.pdf	612187 dc74f4c26c2efd8fbc61e091e0bc0a76c983ecfd	no	4
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6	Non Patent Literature	US1640BR_Noticeof3rdPartyPetition17JAN2022tobeFiled.pdf	1983037 c87dd11cc3156395160 42eb0090f0aeecf8797d6	no	30
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8	Fee Worksheet (SB06)	fee-info.pdf	42854 9ae076e00f78fcbfdbbd95ef41db7ac5d51d012c	no	2
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			Total Files Size (in bytes):	10197726	

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/AIA/31 (03-14)
Approved for use through 01/31/2021. OMB 0651-0031
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NOTICE OF APPEAL FROM THE EXAMINER TO THE PATENT TRIAL AND APPEAL BOARD

Docket Number (Optional): US16/40/WO-US

I hereby certify that this correspondence is being facsimile transmitted to the USPTO, EFS-Web transmitted to the USPTO, or deposited with the United States Postal Service with sufficient postage in an envelope addressed to "Commissioner for Patents, P.O. Box 1450, Alexandria, on Alexandria, VA 22313-1450" [37 CFR 1.8(a)]

on _____.

Signature _____

Typed or printed name _____

In re Application of	
FANSHIER, Benjamin Anson	
Application Number: 16/470,472	Filed: June 17, 2019
For: IMPLEMENT CONTOURING TOOLBAR	
Art Unit: 3671	Examiner: Lutz, Jessica H.

Applicant hereby **appeals** to the Patent Trial and Appeal Board from the last decision of the examiner.

The fee for this Notice of Appeal is (37 CFR 41.20(b)(1)) $ 840.00

☐ Applicant asserts small entity status. See 37 CFR 1.27. Therefore, the fee shown above is reduced by 50%, and the resulting fee is: $ _____

☐ Applicant certifies micro entity status. See 37 CFR 1.29. Therefore, the fee shown above is reduced by 75%, and the resulting fee is: $ _____
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ A check in the amount of the fee is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☑ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. 010442.

☑ Payment made via EFS-Web.

☑ A petition for an extension of time under 37 CFR 1.136(a) (PTO/AIA/22 or equivalent) is enclosed.
For extensions of time in reexamination proceedings, see 37 CFR 1.550.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant

☑ attorney or agent of record
Registration number 65,744

☐ attorney or agent acting under 37 CFR 1.34
Registration number _____

Signature /Nathan E. Whitlock/

Typed or printed name Nathan E. Whitlock

Telephone Number 620-327-6993

Date February 15, 2022

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

☐ * Total of _____ forms are submitted.

This collection of information is required by 37 CFR 41.20(b)(1) and 41.31. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11, 1.14 and 41.6. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/22 (10-20)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)	Docket Number (Optional) US16/40/WO-US
Application Number 16/470,472	Filed June 17, 2019
For IMPLEMENT CONTOURING TOOLBAR	
Art Unit 3671	Examiner Lutz, Jessica H.

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above-identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

		Fee	Small Entity Fee	Micro Entity Fee	
☑	One month (37 CFR 1.17(a)(1))	$220	$110	$55	$ 220.00
☐	Two months (37 CFR 1.17(a)(2))	$640	$320	$160	$
☐	Three months (37 CFR 1.17(a)(3))	$1,480	$740	$370	$
☐	Four months (37 CFR 1.17(a)(4))	$2,320	$1,160	$580	$
☐	Five months (37 CFR 1.17(a)(5))	$3,160	$1,580	$790	$

☐ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ A check in the amount of the fee is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☑ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 010442.

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I am the

☐ applicant.

☑ attorney or agent of record. Registration number 65,744.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/Nathan E. Whitlock/	February 15, 2022
Signature	Date
Nathan E. Whitlock	620-327-6993
Typed or printed name	Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

☐ * Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public, which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Doc Code: AP.PRE.REQ

PTO/AIA/33 (03-13)
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PRE-APPEAL BRIEF REQUEST FOR REVIEW

Docket Number (Optional)
US16/40/WO/US-2

I hereby certify that this correspondence is being facsimile transmitted to the USPTO, EFS-Web transmitted to the USPTO, or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)]
on February 15, 2022

Signature /Nathan E. Whitlock/

Typed or printed name Nathan E. Whitlock

Application Number	Filed
16/470,472	June 16, 2019

First Named Inventor
FANSHIER, Benjamin Anson

Art Unit	Examiner
3671	LUTZ, Jessica H.

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.

This request is being filed with a notice of appeal.

The review is requested for the reason(s) stated on the attached sheet(s).
Note: No more than five (5) pages may be provided.

I am the

☐ applicant.

☑ attorney or agent of record. Registration number 65711.

☐ attorney or agent acting under 37 CFR 1.34.
Registration number if acting under 37 CFR 1.34 _____

/Nathan E. Whitlock/
Signature

Nathan E. Whitlock
Typed or printed name

620-327-6993
Telephone number

February 15, 2022
Date

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

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This collection of information is required by 35 U.S.C. 132. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11, 1.14 and 41.6. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
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3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PATENT

UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor (First):	FANSHIER, Benjamin Anson	Art Unit:	3671
Application No.:	16/470,472	Examiner:	Lutz, Jessica H.
Filed:	June 17, 2019	Docket No.:	US16/40/WO/US-2
Confirmation No.:	1653		

Title: **IMPLEMENT CONTOURING TOOLBAR**

Electronically Filed February 15, 2022

PRE-APPEAL BRIEF REQUEST FOR REVIEW

Commissioner for Patents
Mail Stop – AF
P.O. Box 1450
Alexandria, Virginia 22313-1450

Sir:

This paper is filed in response to the Examiner's remarks in the Final Office Action dated October 28, 2021, and the Advisory Action dated February 4, 2022. This request is being submitted with a Notice of Appeal and a Pre-Appeal Brief Request for Review (PTO/AIA/33) in accordance with the requirements of the Pre-Appeal Brief Conference Pilot Program.

Claims 1 and 3-21 are currently pending in the application. Claims 1, 8-16, 18-21 stand rejected under 35 U.S.C. § 102(a)(1), and claims 3-7 and 17 stand rejected under 35 U.S.C. § 103. *See Final Office Action*, October 28, 2021. Claims 1, 3-18, and 21 are directed to systems (e.g., agricultural implements) having a frame, toolbar oriented parallel to the frame, and row units coupled to the toolbar. Claim 18 is directed to a control system for such an implement, and claim 20 is directed to a computer-implemented method for such an implement.

Claims 1, 8-16, and 18-21 stand rejected under 35 U.S.C. § 102(a)(1) as anticipated by U.S. Patent 8,573,319 ("Casper"). Claims 3-7 stand rejected under 35

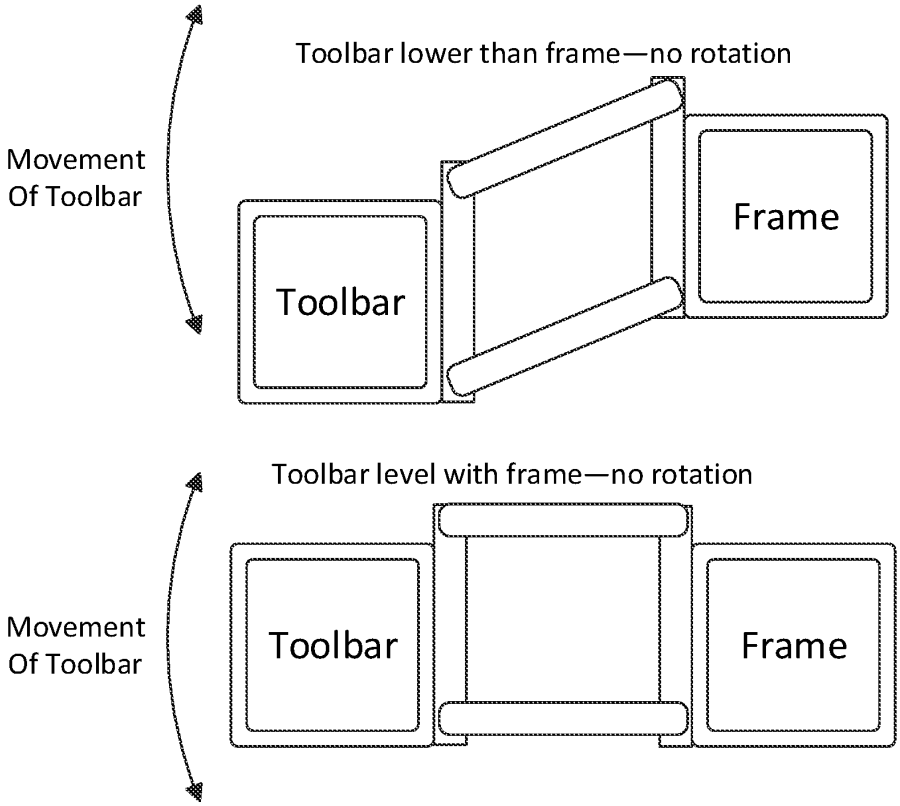
U.S.C. § 103 as being unpatentable over Casper in view of U.S. Patent Publication 2019/0021211 ("Gutknecht"). Claim 17 stands rejected under 35 U.S.C. § 103 as being unpatentable over Casper alone.

I. Claims 1, 3-18, and 21

A. Casper does not disclose an actuator configured to rotate a toolbar

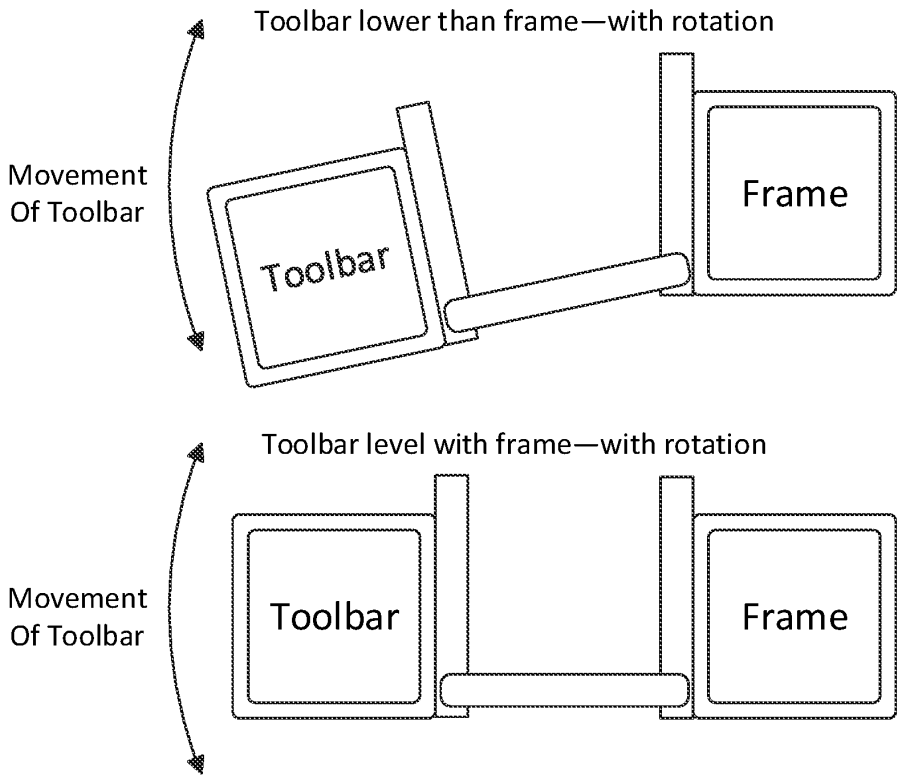
Casper discloses a third frame section 85 pivotally coupled to a first frame section 20 by a parallel linkage such that its height is controlled by an actuator 300 (parallel linkage not numbered, but shown best in FIG. 7 of Casper).

The toolbar (third frame section 85) is connected to the frame (first frame section 20) by a parallel linkage. The toolbar does not rotate relative to the frame, but may be raised and lowered relative to the frame. The toolbar revolves around the frame, but does not rotate. This motion is common to toolbars connected to frames by parallel linkages, and is illustrated in two different positions below:



In these two positions, the toolbar is in the same orientation relative to the frame. In other words, the top of the toolbar in the top image is parallel to the top of the toolbar in the bottom image, and the side of the toolbar in the top image is parallel to side of the toolbar in the bottom. Only the toolbar's position (height and lateral distance) around the frame has changed. This motion is referred to as "revolution," see Surbhi S, *Difference between Rotation and Revolution*, https://keydifferences.com/difference-between-rotation-and-revolution.html, March 1, 2021, (last visited December 17, 2021, copy attached to Response to Final Office Action filed December 20, 2022). This change in position can be deconstructed as a vertical translation component plus a horizontal translation component (though because the toolbar is connected to the frame by a parallel linkage, both must occur simultaneously).

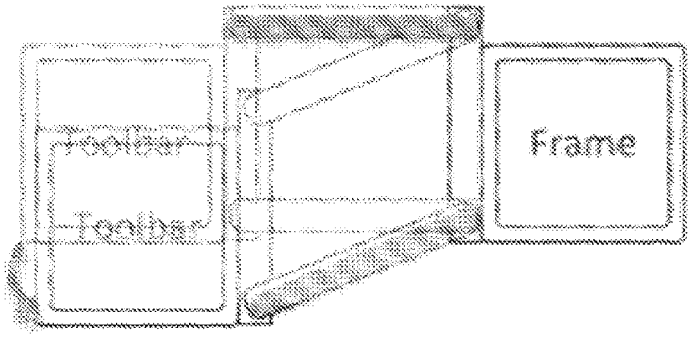
In contrast, the motion of the toolbar illustrated below includes both revolution and rotation (see also, Applicant's FIG. 3):



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In these positions, the toolbar is in a different orientation relative to the frame, and thus, the toolbar itself has rotated. Its position (height and lateral distance) around the frame has also changed.

In the Advisory Action, the Office overlays the two images shown above on p. 2:



and asserts that "the space between the end linkage of the parallel linkage and the end of the frame changes." *Advisory Action*, Continuation Sheet. However, a change in the space is not the same as rotation because the same motion could occur by simple translation of the toolbar (*e.g.*, with a horizontal translation component and vertical translation component). The only parts in the image that rotate are the bars of the parallel linkage.

Casper does not disclose "an actuator . . . configured to rotate the toolbar relative to the frame member," but only an actuator configured to cause revolution of the toolbar about the frame member. Furthermore, rotation of the toolbar would not have been obvious to a person having ordinary skill in the art because rotation of the toolbar would change the orientation of the row units thereon, and thus, other controls would be required to provide proper orientation of the row units.

For the foregoing reasons, the rejection of independent claim 1 should be reversed. The rejection of claims 3-18 and 21 should be reversed at least because they depend from claim 1.

Gutknecht is relied on in the Final Office Action only as teaching elements of dependent claims 3-7. This reference is not discussed herein because independent claim 1, from which these claims depend, is novel and nonobvious for the reasons set forth above.

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II. Claim 19

Claim 19 is directed to a control system, and is novel and nonobvious for substantially the same reason as claim 1, explained above. Therefore, the rejection of independent claim 19 should be reversed.

III. Claim 20

Claim 20 is directed to a computer-implemented method for an implement, and is novel and nonobvious for substantially the same reason as claim 1, explained above. Therefore, the rejection of independent claim 20 should be reversed.

CONCLUSION

For at least the foregoing reasons, Appellant submits that the rejections are clearly erroneous and that the Office has not established anticipation or a prima facie case of obviousness against any of claims 1 or 3-21. Accordingly, Appellant respectfully requests that the rejections of claims 1 and 3-21 be reversed.

Respectfully submitted:

By: /Nathan E. Whitlock/

Nathan E. Whitlock
Reg. No.: 65,744
AGCO Corporation
Patent Department
420 W Lincoln Blvd
Hesston, KS 67062
Phone: (620) 327-6993

February 15, 2022

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
AGCO - Exhibit No. 2005
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/470,472	06/17/2019	Benjamin Anson Fanshier	US16/40/WO/US-2	1653

88988 7590 03/28/2022

AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston, KS 67062

EXAMINER
LUTZ, JESSICA H

ART UNIT	PAPER NUMBER
3671	

NOTIFICATION DATE	DELIVERY MODE
03/28/2022	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patents@agcocorp.com

Notice of Panel Decision from Pre-Appeal Brief Review

Application No.	Applicant(s)		
16/470,472	Fanshier et al.		
Examiner	**Art Unit**	**AIA (FITF) Status**	
JESSICA H LUTZ	3671	Yes	

This is in response to the Pre-Appeal Brief Request for Review filed 15 February 2022 .

1. ☐ **Improper Request** - The Request is improper and a conference will not be held for the following reason(s):

☐ The Notice of Appeal has not been filed concurrent with the Pre-Appeal Brief Request.
☐ The request does not include reasons why a review is appropriate.
☐ A proposed amendment is included with the Pre-Appeal Brief request.
☐ Other: _____ .

The time period for filing a response continues to run from the receipt date of the Notice of Appeal or from the mail date of the last Office communication, if no Notice of Appeal has been received.

2. ☑ **Proceed to Board of Patent Appeals and Interferences** - A Pre-Appeal Brief conference has been held. The application remains under appeal because there is at least one actual issue for appeal. Applicant is required to submit an appeal brief in accordance with 37 CFR 41.37. The time period for filing an appeal brief will be reset to be one month from mailing this decision, or the balance of the two-month time period running from the receipt of the notice of appeal, whichever is greater. Further, the time period for filing of the appeal brief is extendible under 37 CFR 1.136 based upon the mail date of this decision or the receipt date of the notice of appeal, as applicable.

☑ The panel has determined the status of the claim(s) is as follows:
Claim(s) allowed: _____ .
Claim(s) objected to: _____ .
Claim(s) rejected: 1 and 3-21 .
Claim(s) withdrawn from consideration: _____ .

3. ☐ **Allowable application** - A conference has been held. The rejection is withdrawn and a Notice of Allowance will be mailed. Prosecution on the merits remains closed. No further action is required by applicant at this time.

4. ☐ **Reopen Prosecution** - A conference has been held. The rejection is withdrawn and a new Office action will be mailed. No further action is required by applicant at this time.

All participants:

(1) JESSICA H LUTZ .	(3) Heather Shackelford .
(2) Thomas Will .	(4) _____ .

/JESSICA H LUTZ/ Primary Examiner, Art Unit 3671	/THOMAS B WILL/ Supervisory Patent Examiner, Art Unit 3671	/HEATHER C SHACKELFORD/ Primary Examiner, OPQA

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
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To: patents@agcocorp.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 88988

Mar 28, 2022 04:33:15 AM

Dear PAIR Customer:

AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston, KS 67062
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 88988 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

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Application	Document	Mailroom Date	Attorney Docket No.
16470472	AP.PRE.DEC	03/28/2022	US16/40/WO/US-2

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If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

PATENT

UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor (First):	FANSHIER, Benjamin Anson	Art Unit:	3671
Application No.:	16/470,472	Examiner:	Lutz, Jessica H.
Filed:	June 17, 2019	Docket No.:	US16/40/WO/US-2
Confirmation No.:	1653		

Title: **IMPLEMENT CONTOURING TOOLBAR**

APPEAL BRIEF

Mail Stop Appeal Brief – Patent
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

This Appeal Brief is submitted as a single copy pursuant to 37 C.F.R. § 41.37, and in the format required by 37 C.F.R. § 41.37(c)(1). The fee under 37 C.F.R. § 41.20(b)(1) for filing a Notice of Appeal was paid on February 15, 2022, when the Notice of Appeal was filed. Please apply any charges or any credits in connection with the filing of this Appeal Brief to Deposit Account No. 01-0442. The time period for filing an appeal brief is one month from the mailing date of the Notice of Panel Decision from Pre-Appeal Brief Review, which expires on April 28, 2022.

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I. REAL PARTIES IN INTEREST

U.S. application Serial No. 16/470,472 ("the '472 Application"), the application at issue in the above-referenced appeal, names Benjamin Anson Fanshier and Rex Schertz as the inventors. The '472 Application was assigned to AGCO Corporation on December 16, 2016, as evidenced by the assignment recorded with the U.S. Patent and Trademark Office on June 17, 2019, at Reel 049491, Frame 0606. Therefore, the real party in interest in the pending appeal is AGCO Corporation.

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II. RELATED APPEALS, INTERFERENCES, AND TRIALS

None.

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III. SUMMARY OF THE CLAIMED SUBJECT MATTER

In compliance with the provisions of 37 CFR § 41.37, following is a concise explanation of the subject matter defined in each of the independent claims involved in the appeal, which explanation refers to the specification by paragraph number and to the drawings by reference character.

All citations to the specification of the instant application, in this section and in the following sections of the Appeal Brief, refer to the as-filed specification.

A) Claims 1, 3 through 18, and 21 are drawn to a system. Specifically, independent claim 1 recites:

Independent Claim on Appeal	Summary / Embodiment in Specification
1. A system comprising:	Implement 14A, *Specification*, ¶ [0016]; FIG. 3.
an elongate frame member;	"The implement 14A is depicted diagrammatically with the frame member 20A comprising a bracket arm 42A, the bracket arm 42A pivotably coupled to the toolbar 38A (e.g., via a hinged connection at the bracket arm 30 (FIG. 2) and the bracket arm 42)." *Specification*, ¶ [0023]; FIG. 3. *See also* FIG. 1, showing "parallel frame members 20, 22," *Specification*, ¶ [0016], to be elongate.
an elongate toolbar coupled to the frame member via a hinged joint, the toolbar oriented parallel to the frame member;	"The implement 14A is depicted diagrammatically with the frame member 20A comprising a bracket arm 42A, the bracket arm 42A pivotably coupled to the toolbar 38A (e.g., via a hinged connection at the bracket arm 30 (FIG. 2) and the bracket arm 42)." *Specification*, ¶ [0023]; FIG. 3. *See also* FIG. 1, showing "parallel frame members 20, 22," *Specification*, ¶ [0016], to be elongate. Frame member 22 is analogous to toolbar 38A.
a plurality of row units coupled to the toolbar;	"The toolbar 38A is coupled to the row unit 33B via a linkage 44." *Specification*, ¶ [0023].

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Independent Claim on Appeal	Summary / Embodiment in Specification
a first sensor configured to sense a position of the toolbar relative to ground;	"In one embodiment, the control of the actuation is based on one or more sensors that sense the position of the toolbar 38A. . . . In general, to enable the toolbar 38A (and hence toolbar 38A) to follow the contour of the field, sensor information is received about the (relative) position of the toolbar 38A (and by extension, the relative position of the row unit 33B) relative to the ground." *Specification*, ¶ [0027].
an actuator coupled between the frame member and the toolbar,	"In one embodiment, the actuator 32A (as with the other actuators 32) is attached to an upper portion of the frame member 20 (e.g., at or proximal to the upper portion of the bracket arm 42) and the bracket arm 30 opposite the toolbar 38." *Specification*, ¶ [0022], FIG. 1, FIG. 3.
the actuator configured to rotate the toolbar relative to the frame member based on a sensed position of the toolbar.	"The actuator 32A-1 provides for retracting and extending movements that cause the toolbar 38A to rotate relative to the frame member 20A." *Specification*, ¶ [0023]. "[T]he controller 34 (FIG. 1) can track based on a signal from the sensors 48, 50 at what angle the toolbar 38A has rotated relative to the frame 20A (from sensor 48) and the ground (from sensor 50)." *Specification*, ¶ [0029].

B) Claim 19 is drawn to a control system for an implement. Specifically, independent claim 19 recites:

Independent Claim on Appeal	Summary / Embodiment in Specification
19. A control system	"[A]n example control system 74." *Specification*, ¶ [0035], FIG. 5A.

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Independent Claim on Appeal	Summary / Embodiment in Specification
for an implement comprising a frame member and a toolbar coupled to the frame member parallel to the frame member via a hinged joint,	"The implement 14A is depicted diagrammatically with the frame member 20A comprising a bracket arm 42A, the bracket arm 42A pivotably coupled to the toolbar 38A (e.g., via a hinged connection at the bracket arm 30 (FIG. 2) and the bracket arm 42)." *Specification*, ¶ [0023]; FIG. 3.
wherein a plurality of row units are secured to the toolbar, the control system comprising:	"The toolbar 38A is coupled to the row unit 33B via a linkage 44." *Specification*, ¶ [0023].
a controller;	"The tractor 12 also comprises a controller 34 that causes actuation of the actuators 32." *Specification*, ¶ [0019].
at least one sensor configured to sense a position of the toolbar relative to ground; and	"In one embodiment, the control of the actuation is based on one or more sensors that sense the position of the toolbar 38A. . . . In general, to enable the toolbar 38A (and hence toolbar 38A) to follow the contour of the field, sensor information is received about the (relative) position of the toolbar 38A (and by extension, the relative position of the row unit 33B) relative to the ground." *Specification*, ¶ [0027].
an actuator coupled between the frame member and the toolbar, wherein the controller is configured to receive at least one signal from the at least one sensor indicating the position of the toolbar relative to the ground and cause the actuator to rotate the toolbar based on the sensed position of the toolbar.	"In one embodiment, the actuator 32A (as with the other actuators 32) is attached to an upper portion of the frame member 20 (e.g., at or proximal to the upper portion of the bracket arm 42) and the bracket arm 30 opposite the toolbar 38." *Specification*, ¶ [0022], FIG. 1, FIG. 3. "the rod of the actuator 62 extending to rotate the toolbar 56 downward to adjust to the change in contour;" *Specification*, ¶ [0032]. "the actuator configured to rotate the toolbar based on a sensed position of the toolbar;" *Specification*, ¶ [0011].

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C) Claim 20 is drawn to a computer-implemented method for an implement. Specifically, independent claim 20 recites:

Independent Claim on Appeal	Summary / Embodiment in Specification
A computer-implemented method for an implement that comprises a toolbar that has a plurality of row units secured thereto,	"one embodiment of a computer-implemented method for an implement that comprises a toolbar that has row units secured thereto;" *Specification*, ¶ [0047], FIG. 6.
the method for adjusting a rotation of the toolbar based on a contour of a field on which the implement traverses, the method comprising:	"the method for adjusting a rotation of the toolbar based on a contour of a field on which the implement traverses, the method denoted as method 102 and illustrated in FIG. 6;" *Specification*, ¶ [0047].
at a controller:	"at a controller (e.g., controller 34, FIG. 5B);" *Specification*, ¶ [0047].
receiving an indication of a first angle change of the toolbar relative to ground;	"receiving an indication of a first angle change of the toolbar relative to ground; (104)" *Specification*, ¶ [0047], FIG. 6.
causing an actuator that pivotably couples the toolbar to the frame member to retract based on the indication of the first angle change;	"causing an actuator that pivotably couples the toolbar to the frame member to retract based on the indication of the first angle change (106);" *Specification*, ¶ [0047], FIG. 6.
receiving an indication of a second angle change of the toolbar relative to the ground; and	"receiving an indication of a second angle change of the toolbar relative to the ground (108);" *Specification*, ¶ [0047], FIG. 6.
causing the actuator to extend based on the indication of the second angle change.	"causing the actuator to extend based on the indication of the second angle change (110);" *Specification*, ¶ [0047], FIG. 6.

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IV. ARGUMENT

A. Summary of Teachings of Cited Prior Art References

1. U.S. Patent 8,573,319 to Casper et al.

Casper discloses a control system for an agricultural implement that includes a first frame section 20, a second frame section 65, and a third frame section 85 carrying ground-engaging tools 90. *Casper*, col. 3, line 21 through col. 4, line 13. A position sensor is 130 configured to measure the operating depth of the ground-engaging tool 90. *Casper*, col. 4, line 64 through col. 5, line 2. The third frame section 85 is pivotally coupled to the first frame section 20 by a parallel linkage such that its height is controlled by an actuator 300 (parallel linkage not numbered, but shown best in FIG. 7).

2. U.S. Patent Publication 2019/0021211 to Gutknecht

Gutknecht discloses an implement with a row unit leveling system having a parallel linkage and an angle sensor. *Gutknecht*, Abstract. The sensor 70 is used to measure the angle of the parallel linkage 60 to determine the position of the row unit 24 with respect to the toolbar 14. *See Gutknecht*, FIG. 2.

B. Claims 1, 8-16, and 18-21 are not anticipated by Casper under 35 U.S.C. § 102(a)(1)

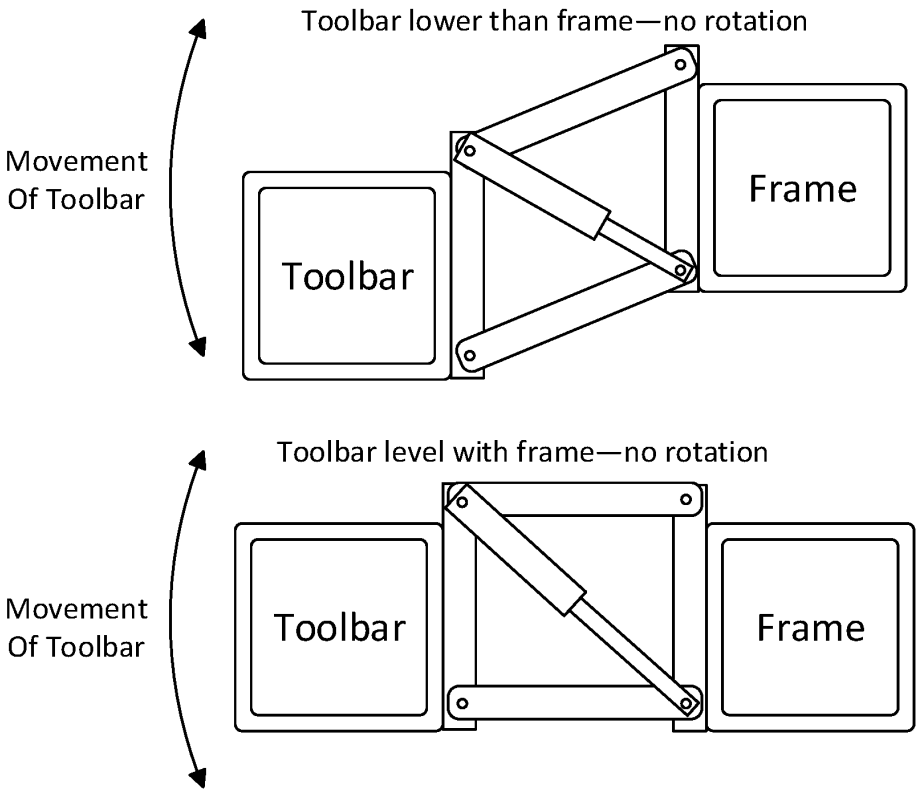
The 35 U.S.C. § 102(a)(1) rejection of claims 1, 8-16, 18, and 21 should be reversed because Casper does not expressly or inherently disclose a system meeting all the elements of claim 1, from which each of claims 8-16, 18, and 21 depends. Casper does not disclose, among other elements, "an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar relative to the frame member based on a sensed position of the toolbar," as recited in independent claim 1. The rejection of independent claims 19 and 20 should be reversed based on similar language in those claims.

1. The actuator in Casper is not configured to rotate the toolbar.

The Office relies on the actuator 300 as being configured to rotate the toolbar 85. *Final Office*

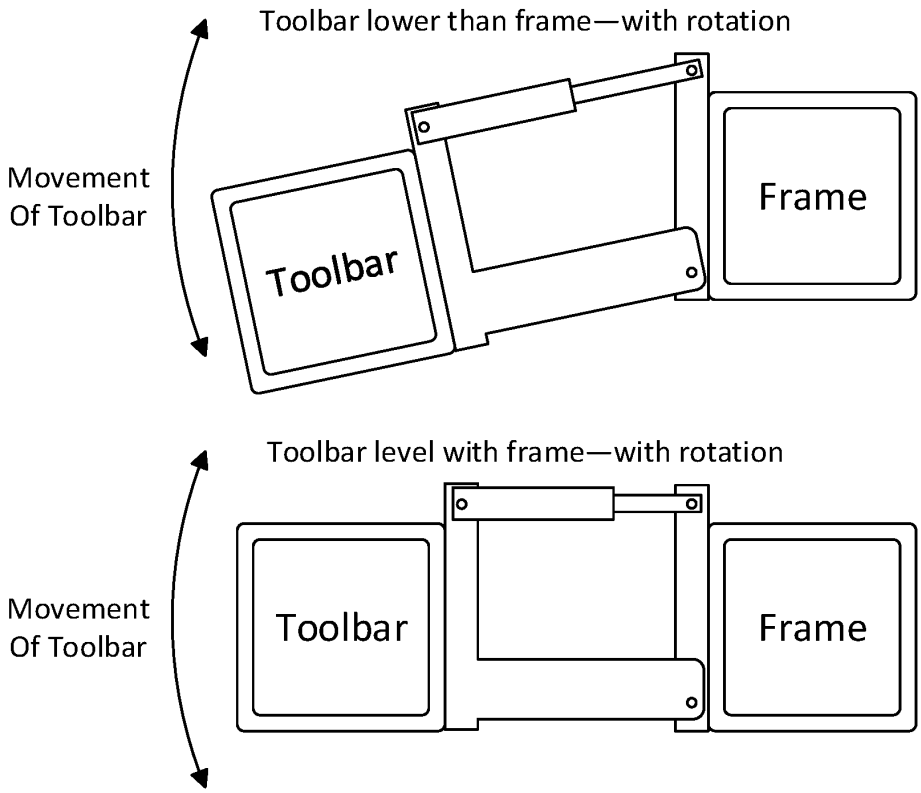
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Action, p, 3. However, because the toolbar 85 is connected by a parallel linkage, the toolbar 85 does not rotate relative to the second frame section 65. The toolbar 85 instead may be raised and lowered relative to the second frame section 65. The toolbar 85 revolves around the section frame section 65, but does not rotate. This motion is common to parts connected by parallel linkages, and is illustrated in a simplified cross-sectional side view in two different positions below, with the position controlled by the length of an actuator connected at to the toolbar end of one link and the frame end of the other link. This is the lift mechanism shown in Casper.



In these two positions of the toolbar, the toolbar is in the same rotational orientation relative to the frame. Only its position (height and lateral distance) around the frame has changed. The motion of the toolbar pictured above is referred to as "revolution." *See* Surbhi S, *Difference between Rotation and Revolution*, https://keydifferences.com/difference-between-rotation-and-revolution.html, March 1, 2021, (last visited December 17, 2021, copy attached in the Evidence Appendix). In contrast, the motion of the

toolbar illustrated below includes both revolution and rotation (see also FIG. 3 of the '472 Application):



In these positions of the toolbar, the toolbar is in a different rotational orientation relative to the frame, and thus, the toolbar has rotated. Its position (height and lateral distance) around the frame has also changed. Note that in FIG. 3 of the '472 Application, the toolbar 38A is connected to a bracket arm 42A of the frame member 20A by an actuator 32A-1, and the row unit 33B is connected to the toolbar 38A by a parallel linkage 44. Claim 1 of the '472 Application reads on the connection between the frame member 20A (via bracket arm 42A) and the toolbar 38A.

Casper does not disclose "an actuator . . . configured to rotate the toolbar relative to the frame member," but only an actuator configured to cause revolution of the toolbar about the frame member without rotation.

The Office asserts in the Final Office Action:

> However, the hinge point of where actuator 300 is attached (see Image 1 below), provides rotation of toolbar 85 during actuation of 300. Therefore, the toolbar 85 does rotate relative to the frame (linkage) as shown in the movement of the pivot links in fig 1 to fig. 2, which have a pivot point relative to frame that allows the toolbar to be lifted.

Final Office Action, p. 6. The Office's reference to the lifting of the toolbar, as shown in FIGS. 1 and 2 of Casper, indicates that the Office is conflating the revolution of the toolbar 85 about the frame with rotation. Revolution moves the toolbar 85, but does not require rotation, such as when the toolbar 85 is connected by a parallel linkage. Indeed, a comparison of FIG. 1 to FIG. 2 of Casper indicates that the toolbar (the bar to which the tools 90 are attached, not specifically labeled in FIGS. 1 and 2) has not rotated between these figures because the tools 90 thereon have not rotated. The tools 90 and the toolbar have simply moved downward relative to the first frame section 20.

Another possible interpretation of the language in the Final Office Action quoted above is that the Office is considering one of the links of the parallel linkage as the frame. *Office Action*, p. 6 ("the toolbar 85 does rotate relative to the frame (linkage)"). Even if the linkage were considered a frame by a person having ordinary skill in the art, such a linkage is not oriented parallel to the frame member, as recited in claim 1. Furthermore, no person having ordinary skill in the art would even consider a parallel linkage an elongate frame member in view of the specification of the '472 Application because the frame member is described in the specification of the '472 Application as, for example, parallel to the toolbar (¶ [0011]), having wheels mounted thereto (¶ [0012]), and optionally having folding wing sections (¶ [0016]). The parallel linkages of Casper have none of these features.

Claim 19 is not anticipated for similar reasons as claim 1. That is, Casper does not expressly or inherently disclose a control system having "an actuator coupled between the frame member and the toolbar, wherein the controller is configured to receive at least one signal from the at least one sensor indicating the position of the toolbar relative to the ground and cause the actuator to rotate the toolbar based on the sensed position of the toolbar," as recited in claim 19.

Likewise, Casper does not expressly or inherently disclose "receiving an indication of a first angle change of the toolbar relative to ground; causing an actuator that pivotably couples the toolbar to the frame

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member to retract based on the indication of the first angle change; receiving an indication of a second angle change of the toolbar relative to the ground; and causing the actuator to extend based on the indication of the second angle change," as recited in claim 20. Because the toolbar of Casper does not rotate, there is no disclosure of indications of angle changes of the toolbar relative to ground. Furthermore, because the toolbar is connected by a parallel linkage, extension or retraction of an actuator does not cause the angle of the toolbar to change.

Thus, Casper does not anticipate independent claims 1, 19, or 20, and these claims are novel over Casper. The novelty of claim 1 precludes a rejection of claims 8-16, 18, and 21 because these claims each include all the elements of claim 1. Appellant therefore requests that the Board reverse the 35 U.S.C. § 102(a)(1) anticipation rejection of claims 1, 8-16, and 18-21 based on Casper.

2. Casper does not disclose rotating the toolbar throughout an obtuse angle

Claim 18 is further allowable because Casper does not disclose that "the actuator is configured to rotate the toolbar throughout an obtuse angle range." The Office relies on FIG. 1 of Casper as disclosing this element. *Final Office Action*, p. 3. However, there is no such disclosure in FIG. 1, which Appellant pointed out on July 29, 2021 in a response to a prior office action.

The Office did not respond to Appellant's argument in the Final Office Action, and simply repeated the rejection without further comment or explanation. "Office personnel should consider all rebuttal arguments and evidence presented by applicants." MPEP § 2145. The Office has not addressed Appellant's arguments with respect to claim 18. Thus, the rejection of claim 18 should be overturned for this additional reason. Appellant therefore requests that the Board reverse the 35 U.S.C. § 102(a)(1) rejection of claim 18 based on Casper.

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C. Claims 3-7 are not obvious under 35 U.S.C. § 103 based on Casper and Gutknecht

The 35 U.S.C. § 103(a) rejection of claims 3-7 should be reversed because Casper and Gutknecht, when considered in combination together as a whole, do not make obvious all the elements of claim 1, from which claims 3-7 depend.

As an initial matter, Gutknecht is not prior art to claims 3-7 of the '472 Application. The '472 Application is a U.S. national phase entry of PCT/IB2017/001298, filed October 26, 2017, which claims priority to U.S. Provisional Patent Application 62/435,118, filed December 16, 2016. Support for claims 3-7 is found in U.S. Provisional Patent Application 62/435,118, which shares the same specification, claims, and drawings as PCT/IB2017/001298. Therefore, the priority date of claims 3-7 is December 16, 2016. Gutknecht is based on U.S. Patent Application 15/655,225, filed July 20, 2017. Because the application upon which Gutknecht is based was filed after the priority date of the present claims, Gutknecht is not prior art to claims 3-7 of the '472 Application.

The Office relies on Gutknecht as teaching a sensor 70 for measuring the angle of a parallel linkage 60. *Final Office Action*, p. 5. However, Gutknecht does not teach "an actuator . . . configured to rotate the toolbar relative to the frame member." Therefore, even if Gutknecht were prior art to the '472 Application, Gutknecht still would not cure the deficiency of Casper with respect to claim 1, from which claims 3-7 depend.

Therefore, Appellant requests that the Board reverse the 35 U.S.C. § 103 obviousness rejection of claims 3-7 over Casper in view of Gutknecht.

D. Claim 17 is not obvious under 35 U.S.C. § 103 based on Casper alone

The 35 U.S.C. § 103(a) rejection of claim 17 should be reversed because Casper does not make obvious all the elements of claim 1, from which claim 17 depends.

Casper does not teach, suggest, or otherwise render obvious the elements of claim 1. As discussed above in Section IV(B)(1), the mechanism of Casper for raising and lowering the toolbar is a parallel linkage. This mechanism results in the revolution of the toolbar about the frame, but not the rotation of the toolbar

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relative to the frame. There is no teaching or suggestion in Casper to rotate the toolbar, and this does not appear to be an obvious variation of the system disclosed in Casper. The Office takes official notice that Hall Effect and rotational sensors are equivalents in the art. Whether this is true or not, Casper still lacks any teaching of the elements of claim 1. Thus, Appellant requests that the Board reverse the 35 U.S.C. § 103 obviousness rejection of claim 17 over Casper.

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V. CONCLUSION

Appellant respectfully requests the reversal of the rejections of currently pending claims 1 and 3 through 21 for the reasons set forth above, and requests that claims 1 and 3 through 21 be allowed to issue.

Respectfully submitted,

/Nathan E. Whitlock/

Nathan E. Whitlock
Reg. No.: 65,744
AGCO Corporation
Patent Department
420 W Lincoln Blvd
Hesston, KS 67062
Phone: (620) 327-6993

Date: April 6, 2022

Attachments: Claims Appendix
Evidence Appendix

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VI. CLAIMS APPENDIX

1. (Previously Presented) A system, comprising:

an elongate frame member;

an elongate toolbar coupled to the frame member via a hinged joint, the toolbar oriented parallel to the frame member;

a plurality of row units coupled to the toolbar;

a first sensor configured to sense a position of the toolbar relative to ground; and

an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar relative to the frame member based on a sensed position of the toolbar.

2. (Canceled)

3. (Previously Presented) The system of claim 1, further comprising a second sensor configured to sense an angle of the toolbar relative to the frame member.

4. (Previously Presented) The system of claim 3, further comprising a controller configured to receive first and second signals from the first and second sensors and cause actuation of the actuator based on the first and second signals.

5. (Original) The system of claim 4, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

6. (Original) The system of claim 5, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

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7. (Original) The system of claim 4, wherein the controller is further configured to cause adjustment of a rate of rotation based on the first signals from the first sensor.

8. (Previously Presented) The system of claim 1, further comprising a controller, the controller configured to receive a signal from the first sensor and cause actuation of the actuator based on the signal.

9. (Original) The system of claim 8, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

10. (Original) The system of claim 9, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

11. (Original) The system of claim 8, wherein the controller is further configured to cause adjustment of a rate of rotation based on the signal from the first sensor.

12. (Original) The system of claim 1, wherein the sensed position is relative to a field surface, further comprising one or more electromagnetic sensors coupled to the frame member, the toolbar, or a combination of the frame member and the toolbar, the one or more electromagnetic sensors configured to sense an absolute elevation or change in elevation between the field surface and the toolbar or a combination of both the frame member and the toolbar.

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13. (Previously Presented) The system of claim 12, further comprising a controller configured to receive one or more signals from the one or more electromagnetic sensors and cause actuation of the actuator based on the one or more signals.

14. (Original) The system of claim 13, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

15. (Original) The system of claim 14, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

16. (Original) The system of claim 13, wherein the controller is further configured to cause adjustment of a rate of rotation based on the one or more signals from the one or more electromagnetic sensors.

17. (Original) The system of claim 12, wherein the one or more electromagnetic sensors comprise ultrasonic, lidar, or radar sensors.

18. (Original) The system of claim 1, wherein the actuator is configured to rotate the toolbar throughout an obtuse angle range.

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19. (Previously Presented) A control system for an implement comprising a frame member and a toolbar coupled to the frame member parallel to the frame member via a hinged joint, wherein a plurality of row units are secured to the toolbar, the control system comprising:

a controller;

at least one sensor configured to sense a position of the toolbar relative to ground; and

an actuator coupled between the frame member and the toolbar, wherein the controller is configured to

receive at least one signal from the at least one sensor indicating the position of the toolbar relative to the ground and cause the actuator to rotate the toolbar based on the sensed position of the toolbar.

20. (Previously Presented) A computer-implemented method for an implement that comprises a toolbar that has a plurality of row units secured thereto, the method for adjusting a rotation of the toolbar based on a contour of a field on which the implement traverses, the method comprising:

at a controller:

receiving an indication of a first angle change of the toolbar relative to ground;

causing an actuator that pivotably couples the toolbar to the frame member to retract based on the indication of the first angle change;

receiving an indication of a second angle change of the toolbar relative to the ground; and

causing the actuator to extend based on the indication of the second angle change.

21. (Previously Presented) The system of claim 1, further comprising at least one wheel coupled to the frame member and at least partially supporting the frame member relative to the ground.

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VII. EVIDENCE APPENDIX

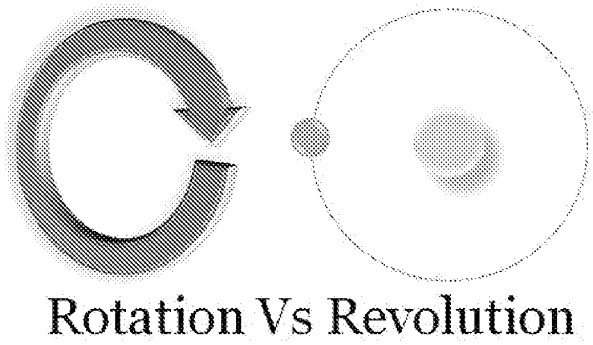
All evidence referred to in this Brief is found in official correspondence between the Examiner and Appellant that is in the record. For the convenience of the Board, Appellant submits a copy of the following herewith:

1. Surbhi S, *Difference between Rotation and Revolution*, https://keydifferences.com/difference-between-rotation-and-revolution.html, March 1, 2021, (last visited December 17, 2021).

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Difference Between Rotation and Revolution

Last updated on March 1, 2021 by Surbhi S



The motion along a curved path is termed as circular motion, like the orbital motion of planets, ice skater, blades of the fan, gears, amusement park rides, etc. The two fundamental concepts which are studied in circular motion are rotation and revolution. While **rotation** means the movement in a circle round an axis, **revolution** is when an object moves in a circular path around another object or center.

Many people often misinterpret these two concepts as they think that these two are same. But this is not so, as they differ from one another in the sense that rotation does not change the position of the object, but revolution does. So, here we've explained the difference between rotation and revolution in detail, take a read.

Content: Rotation Vs Revolution

1. Comparison Chart
2. Definition
3. Key Differences
4. Conclusion

Comparison Chart

BASIS FOR COMPARISON	ROTATION	REVOLUTION
Meaning	Rotation refers to a circular motion around an axis, located within the body of the object.	Revolution means a circular motion around an axis, located outside the object.

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Difference Between PERT and CPM
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Difference Between Brand Equity and Brand Value

NEW ADDITIONS

Difference Between APC and MPC
Difference Between Ungrouped Data and Grouped Data
Difference Between Allowances and Perquisites
Difference Between Normal Loss and Abnormal Loss

BASIS FOR COMPARISON	ROTATION	REVOLUTION
What is it?	Movement of an object on its axis.	A complete round trip around something.
Axis	Internal	External
Change in position	No	Yes
Earth	Rotation of earth, is from west to east, which causes day and night.	Revolution of earth is in counterclockwise manner, which causes seasons.
Example	Hand of clocks, Spinning top, etc.	Rounding a curve in a car, merry go round etc.

Definition of Rotation

The term 'rotation' is defined as the movement of an object, in a circular manner, about a certain point, i.e. turn around, its own axis. There exist an imaginary line known as the rotational axis around which a three-dimensional object rotates.

In the rotation, every point makes a circle around the central point. So, there is an equal distance from the center to any point of the shape. It is expressed in terms of degrees, wherein when the rotation is performed clockwise, the degrees is negative, while an anticlockwise rotation, will result in positive degrees.

The most popular example of rotation is the earth's rotation, which takes approximately 24 hours to complete it, causing day and night.

Definition of Revolution

The term 'revolution' is used to describe a motion, wherein an object moves in a circular direction around an object or centre, in a fixed path or orbit. It involves travelling around an axis outside the object, i.e. external axis.

The distance traveled by an object, in one revolution, around the circle, is nothing but its circumference. The time taken by an object to complete one revolution around the circle is known as the period, represented by T.

The revolution of the Earth around the Sun is in an anticlockwise manner, which takes 365 days and 6 hours to complete. It is the only reason for causing seasons to change.

Difference Between Cost Audit and Management Audit

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Difference Between Multi-Channel and Omni-Channel

Difference Between Listed Company and Unlisted Company

Difference Between Denotation and Connotation

Difference Between Managing Director and Whole time Director

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Key Difference Between Rotation and Revolution

The difference between rotation and revolution can be drawn clearly on the following grounds:

1. A circular motion around an axis, located within the body of the object, is called rotation. A circular motion around an axis, located outside the object, is called a revolution.
2. Rotation is the movement of an object on its own axis. On the other hand, revolution is the complete round trip around something, i.e. another object or center.
3. Rotation is when the object spins around an internal axis. Conversely, revolution is when the object travels around an external axis.
4. In the rotation, the object moves around its axis, without changing its position. As against this, in the revolution, the object moves along an elliptical course, with a continuous change in its position.
5. Earth's rotation is from the west towards the east, which it completes in approx. 24 hours. But, the revolution of the Earth around the Sun is in a counterclockwise manner when you are looking at it from a North direction, i.e. from the North Pole i.e. west to east., which is completed in around, 365 days.
6. Common examples of rotation are the hand of clocks, spinning top, etc. In contrast, the common examples of revolution are rounding a curve in a car, kids merry go round, etc.

Conclusion

Therefore, with the above discussion, you might have gained ample knowledge about the two terms, and will not get confused between them in future. While rotation means spinning around its own axis, revolution means moving around another object. Taking the example of the Earth, which rotates 366 times to complete one revolution around the Sun.

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/470,472	06/17/2019	Benjamin Anson Fanshier	US16/40/WO/US-2	1653

88988 7590 07/28/2022

AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston, KS 67062

EXAMINER
LUTZ, JESSICA H

ART UNIT	PAPER NUMBER
3671	

NOTIFICATION DATE	DELIVERY MODE
07/28/2022	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patents@agcocorp.com

Office Action Summary	Application No. 16/470,472	Applicant(s) Fanshier et al.	
	Examiner JESSICA H LUTZ	Art Unit 3671	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 4/6/22.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1 and 3-21 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1 and 3-21 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Reopening of Prosecution After Appeal Brief

1. In view of the appeal brief filed on 4/6/22, PROSECUTION IS HEREBY REOPENED. New rejections are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

2. A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

/THOMAS B WILL/
Supervisory Patent Examiner, Art Unit 3671

Claim Rejections - 35 USC § 102

3. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention.

5. Claim(s) 1, 3-11, and 19-21 is/are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Gilstring (US 9,301,439)

Regarding claim 1, Gilstring teaches a system, comprising: an elongate frame member; an elongate toolbar coupled to the frame member via a hinged joint (Image 1 below), the toolbar oriented parallel to the frame member (Fig. 3); a plurality of row units coupled to the toolbar (14); a first sensor (positions sensor 18 on cylinder 15a) configured to sense a position of the toolbar relative to ground; and an actuator (15a) coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar relative to the frame member based on a sensed position of the toolbar (fig. 3a-3d).

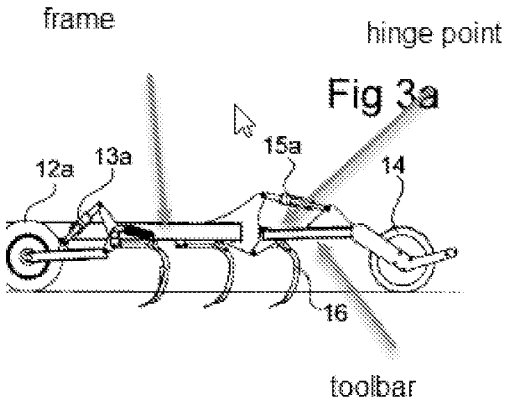


Image 1: annotated drawing taken from Gilstring Fig. 3a

3. The system of claim 1, further comprising a second sensor configured to sense an angle of the toolbar relative to the frame member (19).

4. The system of claim 3, further comprising a controller configured to receive first and second signals from the first and second sensors and cause actuation of the actuator based on the first and second signals (20).

5. The system of claim 4, further comprising a control component (regulating system 17) that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

6. The system of claim 5, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component (4:66-5:11).

7. The system of claim 4, wherein the controller is further configured to cause adjustment of a rate of rotation based on the first signals from the first sensor (signals to begin actuation).

8. The system of claim 1, further comprising a controller (20), the controller configured to receive a signal from the first sensor and cause actuation of the actuator based on the signal (5:30-39).

9. The system of claim 8, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component (17).

10. The system of claim 9, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component (4:66-5:11).

11. The system of claim 8, wherein the controller is further configured to cause adjustment of a rate of rotation based on the signal from the first sensor (signals to begin actuation).

Regarding claim 19, Gilstring teaches a control system for an implement comprising a frame member and a toolbar coupled to the frame member parallel to the frame member via a hinged joint, wherein a plurality of row units are secured to the toolbar, the control system comprising: a controller (20); at least one sensor (18) configured to sense a position of the toolbar relative to ground; and an actuator (15a) coupled between the frame member and the toolbar, wherein the controller is configured to receive at least one signal from the at least one sensor indicating the position of the toolbar relative to the ground and cause the actuator to rotate the toolbar based on the sensed position of the toolbar (5:30-39).

20. A computer-implemented method for an implement that comprises a toolbar that has a plurality of row units secured thereto, the method for adjusting a rotation of the toolbar based on a contour of a field on which the implement traverses, the method comprising: at a controller (20): receiving an indication of a first angle change of the toolbar relative to ground (18); causing an actuator that pivotably couples the toolbar to the frame member to retract based on the indication of the first angle change (fig. 3a-d); receiving an indication of a second angle change of the toolbar relative to the ground; and causing the actuator to extend based on the indication of the second angle change (fig. 2a-d).

21. The system of claim 1, further comprising at least one wheel coupled to the frame member and at least partially supporting the frame member relative to the ground (12a).

Claim Rejections - 35 USC § 103

6. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

7. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim(s) 12-17 is/are rejected under 35 U.S.C. 103 as being unpatentable over Gilstring in view of Henry (US 8,857,530)

Regarding claim 12, Gilstring teaches the system of claim 1, but fails to teach wherein the sensed position is relative to a field surface, further comprising one or more electromagnetic sensors coupled to the frame member, the toolbar, or a combination of the frame member and the toolbar, the one or more electromagnetic sensors configured to sense an absolute elevation or change in elevation between the field surface and the toolbar or a combination of both the frame member and the toolbar. However, Henry teaches a similar system with an electromagnetic sensor on a frame to measure the distance to the soil surface (3:49-62). It would have been obvious to one with ordinary skill in the art, before the effective filing date of the claimed invention, to include an electromagnetic sensor on the frame of Gilstring as an addition of parts that allows for the distance to the ground to be measured and therefore allow for substantially constant penetration depth of the tools as taught beneficial by Henry (4:10-15).

13. The system of claim 12, further comprising a controller configured to receive one or more signals from the one or more electromagnetic sensors and cause actuation of the actuator based on the one or more signals (as modified above).

14. The system of claim 13, further comprising a control component (17) that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

15. The system of claim 14, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component (4:66-5:11).

16. The system of claim 13, wherein the controller is further configured to cause adjustment of a rate of rotation based on the one or more signals from the one or more electromagnetic sensors (as modified).

17. (Original) The system of claim 12, wherein the one or more electromagnetic sensors comprise ultrasonic, lidar, or radar sensors (3:60).

9. Claim(s) 1 and 18 is/are rejected under 35 U.S.C. 103 as being unpatentable over Friesen et al. (US 2014/0069670) in view of Reiber et al. (US 6,112827).

Regarding claim 1, Friesen teaches a system, comprising: an elongate frame member; an elongate toolbar coupled to the frame member via a hinged joint (fig. 1, 13), the toolbar oriented parallel to the frame member 21); a plurality of row units coupled to the toolbar (fig. 4, tools 5 and an actuator (17) coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar relative to the frame member based on a sensed position of the toolbar (fig. 1-

3). Friesen does not teach a first sensor configured to sense a position of the toolbar relative to ground, however, Reiber teaches a similar system with a sensor (13: 55-62). It would have been obvious to one with ordinary skill in the art, before the effective filing date of the claimed invention, to include a sensor on the system of Friesen as an addition of parts that allows to ensure there is not damage to the toolbar or frame during folding and unfolding by sensing the toolbar position relative to the ground as taught beneficial by Reiber (13: 55-62).

18. The system of claim 1, wherein the actuator is configured to rotate the toolbar throughout an obtuse angle range (fig. 1-3).

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JESSICA H LUTZ whose telephone number is (571)270-7308. The examiner can normally be reached M-F 10:30-5 ET.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Will can be reached on 571-272-6998. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like

assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA)

or 571-272-1000.

/JESSICA H LUTZ/
Primary Examiner, Art Unit 3671

Notice of References Cited	Application/Control No. 16/470,472	Applicant(s)/Patent Under Reexamination Fanshier et al.	
	Examiner JESSICA H LUTZ	Art Unit 3671	Page 1 of 4

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20120298388-A1	11-2012	Bauer; Mark A.	A01B73/065	172/311
*	B	US-20140069670-A1	03-2014	Friesen; Dick Edward	A01B73/02	172/311
*	C	US-20200093052-A1	03-2020	Preimess; Hans-Jorg	A01B63/32	1/1
*	D	US-20180070523-A1	03-2018	Prince; Randall	A01B27/005	1/1
*	E	US-20170339819-A1	11-2017	Kowalchuk; Trevor Lawrence	A01C5/068	1/1
*	F	US-20200236873-A1	07-2020	ALBRECHT; WILLIE L.	A01G13/0287	1/1
*	G	US-20130062083-A1	03-2013	Casper; Robert T.	A01B63/16	172/452
*	H	US-20210298215-A1	09-2021	Kovach; Michael George	A01B63/008	1/1
*	I	US-20110315410-A1	12-2011	Kinzenbaw; Jon E.	A01C7/208	172/1
*	J	US-20200146201-A1	05-2020	Figueroa; Carlos Alberto	A01B63/24	1/1
*	K	US-20220132720-A1	05-2022	GRAY; Geof J.	A01B73/065	172/184
*	L	US-10959367-B2	03-2021	Zemenchik; Robert A.	A01B63/008	1/1
*	M	US-9615500-B2	04-2017	Sudbrink; Matthew R.	A01B49/027	1/1

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N	DE-102009044898-A1	06-2011	DE	POKRIEFKE M	A01B63/008
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	P					
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	R					
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NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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	W	
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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

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	Examiner JESSICA H LUTZ	Art Unit 3671	Page 2 of 4

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-10925203-B2	02-2021	Plattner; Chad	A01B3/24	1/1
*	B	US-9635797-B2	05-2017	Kovach; Michael G.	A01B29/048	1/1
*	C	US-9301439-B2	04-2016	Gilstring; Gert	A01B63/114	1/1
*	D	US-10368471-B2	08-2019	Knobloch; Dean A.	A01B23/043	1/1
*	E	US-10827665-B2	11-2020	Sporrer; Adam D.	A01B63/008	1/1
*	F	US-10537052-B2	01-2020	Friggstad; Terrance A.	A01B63/008	1/1
*	G	US-6263977-B1	07-2001	Mayerle; Dean J.	A01B63/102	172/311
*	H	US-10820470-B2	11-2020	Wu; Duqiang	F15B13/042	1/1
*	I	US-6112827-A	09-2000	Reiber; Phillip A.	A01B73/065	172/311
*	J	US-10602653-B2	03-2020	Henry; James W.	A01B73/00	1/1
*	K	US-10412875-B2	09-2019	Kovach; Michael G.	A01B63/008	1/1
*	L	US-9686899-B2	06-2017	Kovach; Michael G.	A01B33/025	1/1
*	M	US-11197408-B2	12-2021	Ferrari; Luca	A01B79/02	1/1

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*	A	US-10368474-B2	08-2019	Blunier; Timothy R.	A01B63/32	1/1
*	B	US-10412873-B2	09-2019	Achten; Georg	A01B49/02	1/1
*	C	US-10813265-B2	10-2020	Stanhope; Trevor	A01B69/007	1/1
*	D	US-10820471-B2	11-2020	Wu; Duqiang	F15B20/00	1/1
*	E	US-10405476-B2	09-2019	Bell; Joshua	A01B29/04	1/1
*	F	US-8857530-B2	10-2014	Henry; Jim	A01B63/114	172/4
*	G	US-5590721-A	01-1997	Van Mill; Michael D.	A01B63/22	172/488
*	H	US-10750653-B2	08-2020	Sporrer; Adam D.	A01B5/04	1/1
*	I	US-9253937-B2	02-2016	Horsch; Michael	A01B73/048	1/1
*	J	US-7921931-B2	04-2011	Henry; Jim	A01B61/04	111/151
*	K	US-5653292-A	08-1997	Ptacek; Timothy J.	A01C7/203	172/310
*	L	US-20180116095-A1	05-2018	Knobloch; Dean A.	A01B23/043	1/1
*	M	US-20150012189-A1	01-2015	Henry; Jim	A01C5/066	701/50

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*	A	US-20150053439-A1	02-2015	Ohnsat; Michael J.	A01B21/08	172/569
*	B	US-20190150350-A1	05-2019	Engel; Gordon Anthony	A01C7/203	1/1
*	C	US-20190021211-A1	01-2019	Gutknecht; Brett	A01B63/22	1/1
*	D	US-20180295769-A1	10-2018	Friggstad; Terrance A.	A01B63/008	1/1
*	E	US-20160134844-A1	05-2016	Casper; Robert T.	H04N7/181	348/135
*	F	US-20140041563-A1	02-2014	Henry; Jim	A01B79/005	111/139
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FOREIGN PATENT DOCUMENTS

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/470,472	Fanshier et al.
	Examiner	Art Unit
	JESSICA H LUTZ	3671

CPC - Searched*		
Symbol	Date	Examiner
a01b 63/114,102,1112,28, 045, 008, 10	06/19/2021	jl
a01b 49/00,027	07/12/2022	jl

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
EAST text (see attached)	06/19/2021	jl
inventor name search	06/19/2021	jl
Updated search	07/13/2022	jl

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/JESSICA H LUTZ/ Primary Examiner, Art Unit 3671	

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AGCO - Exhibit No. 2005
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(19) Deutsches Patent- und Markenamt

(10) **DE 10 2009 044 898 A1** 2011.06.16

(12) # Offenlegungsschrift

(21) Aktenzeichen: **10 2009 044 898.5**
(22) Anmeldetag: **15.12.2009**
(43) Offenlegungstag: **16.06.2011**

(51) Int Cl.: ***A01B 63/14*** (2006.01)
A01B 63/111 (2006.01)
A01B 63/22 (2006.01)
A01C 7/20 (2006.01)
A01B 49/00 (2006.01)

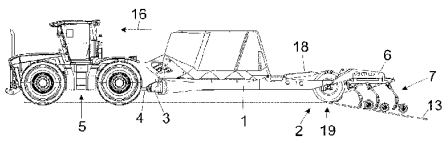
(71) Anmelder:
Amazonen-Werke H. Dreyer GmbH & Co. KG, 49205 Hasbergen, DE

(72) Erfinder:
Pokriefke, Michael, 27798 Hude, DE

Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

(54) Bezeichnung: **Landmaschine**

(57) Zusammenfassung: Landmaschine, insbesondere aufgesattelte Sämaschine, mit einem Maschinenrahmen, der über ein Fahrwerk auf dem Boden abgestützt ist, sowie zumindest einer an einem Tragrahmen angeordneten Arbeitseinheit, umfassend Bodenbearbeitungselement mit zugeordneter Tiefenführungs- und/oder Druckrollen, wobei die Bodenbearbeitungselemente mit den zugeordneten Tiefenführungs- und/oder Druckrollen in Höhenrichtung bewegbar angeordnet und mittels Federelementen gegen den Boden gedrückt werden, wobei der Tragrahmen mittels einer Gelenkanordnung an dem Maschinenrahmen um eine quer zur Fahrtrichtung verlaufende Schwenkachse mittels einer motorischen Stelleinrichtung verschwenkbar angeordnet ist, wobei die Bodenbearbeitungselemente in zumindest zwei Querreihen beabstandet hintereinander angeordnet sind. Um in einfacher Weise eine gleichmäßige Bearbeitungstiefe von Bodenbearbeitungswerkzeugen oder Ablagetiefe des abzulegenden Saatgutes durch Bodenbearbeitungselemente und/oder Säschare erreichen zu können, ist vorgesehen, dass jeweils zumindest einem Bodenbearbeitungselement der vorderen Querreihe und hinteren Querreihe jeweils ein Sensorelement zur Erfassung der Auslenkung des Bodenbearbeitungselementen gegenüber dem Tragrahmen zugeordnet ist, dass der Landmaschine ein Bordcomputer zugeordnet ist, dass die Sensorelemente Signale an den Bordcomputer übermitteln, dass die motorische Stelleinrichtung vom Bordcomputer aufgrund eines im Speicher des Bordcomputers hinterlegten Auswerteprogramms derart ansteuerbar ist, dass durch Verschwenken des Tragrahmens durch die Stelleinrichtung die Auslenkung der Bodenbearbeitungselemente der ersten Querreihe zumindest annähernd gleich der Auslenkung der Bodenbearbeitungselemente der hinteren Querreihe gegenüber dem Tragrahmen während des gesamten Bearbeitungsvorganges einstellbar und/oder zu halten ist.



Beschreibung

[0001] Die Erfindung betrifft eine Landmaschine gemäß des Oberbegriffes des Patentanspruches 1.

[0002] Eine derartige Landmaschine ist beispielsweise durch die DE 10 2006 034 798 A1 bekannt. Diese Landmaschine ist als Sämaschine ausgebildet. Hierbei kann der Maschinenrahmen um eine quer zur Fahrtrichtung verlaufende Schwenkachse mittels einer motorischen Stelleinrichtung verstellt werden, um eine Anpassung der Säschare an die Bodenkontur zu erreichen, damit möglichst eine gleichmäßige Arbeitstiefe bzw. Ablagetiefe des auszubringenden Saatgutes sichergestellt ist. Die Anordnung und Ausgestaltung des Maschinenrahmens zur Anpassung der als Säschare ausgebildeten Bodenbearbeitungselemente ist relativ aufwendig.

[0003] Der Erfindung liegt die Aufgabe zugrunde, in einfacher Weise eine gleichmäßige Bearbeitungstiefe von Bodenbearbeitungswerkzeugen und/oder Ablagetiefe des abzulegenden Saatgutes durch Bodenbearbeitungselemente und/oder Säschare erreichen zu können.

[0004] Diese Aufgabe wird erfindungsgemäß durch die kennzeichnenden Merkmale des Patentanspruches 1 gelöst. Infolge dieser Maßnahmen wird in einfacher Weise die Lage der Bodenbearbeitungselemente zum Maschinenrahmen abgefragt und der Maschinenrahmen soweit nachgestellt, dass die Bodenbearbeitungselemente in der ersten Querreihe sich in der gleichen Lage zu dem Maschinenrahmen wie die Bodenbearbeitungselemente der hinteren Querreihe befinden. Somit ist also in überraschend einfacher Weise nur durch die Verstellung des Maschinenrahmens, an dem die Bodenbearbeitungselemente angeordnet sind, bei unebenen und sich ändernden Bodenoberflächen eine gleichmäßige Bearbeitungstiefe zu erreichen.

[0005] Somit wird in einfacher Weise eine bodenparallele Ausrichtung des Tragrahmens durch die Abtastung der Bodenparallelität mittels der Ermittlung der Winkellage bzw. Lage der Bodenbearbeitungselemente ermöglicht. Somit lässt sich in einfacher Weise die Arbeitstiefe beim Überqueren von Senken und Bergkuppen in überraschend einfacher Weise erreichen. Es findet also ein einfacher Abgleich der Winkelstellung zwischen dem Bodenbearbeitungselement der vorderen und hinteren Querreihe statt.

[0006] Um die Landmaschine in einfacher Weise als Sämaschine einsetzen zu können, ist vorgesehen, dass die als Arbeitseinheit ausgebildete Säeinheit zumindest ein Säschar mit Tiefenführungs- und/oder Druckrolle umfasst.

[0007] Weitere Einzelheiten der Erfindung sind der Beispielsbeschreibung und den Zeichnungen zu entnehmen. Hierbei zeigen

[0008] Fig. 1 die Landmaschine in Seitenansicht und Prinzipdarstellung beim Überqueren einer Bergkuppe ohne Nachstellung des Maschinenrahmens gegenüber dem Tragrahmen,

[0009] Fig. 2 den an dem Tragrahmen angeordneten Maschinenrahmen mit Säscharen und Tiefenführungsrollen gemäß Fig. 1 in vergrößertem Maßstab,

[0010] Fig. 3 die Landmaschine in Seitenansicht und Prinzipdarstellung beim Überqueren einer Bergkuppe mit Nachstellung des Maschinenrahmens gegenüber dem Tragrahmen,

[0011] Fig. 4 den an dem Tragrahmen angeordneten Maschinenrahmen mit Säscharen und Tiefenführungsrollen gemäß Fig. 3 in vergrößertem Maßstab,

[0012] Fig. 5 die Landmaschine in Seitenansicht und Prinzipdarstellung beim Überqueren einer Senke mit Nachstellung des Maschinenrahmens gegenüber dem Tragrahmen und

[0013] Fig. 6 den an dem Tragrahmen angeordneten Maschinenrahmen mit Säscharen und Tiefenführungsrollen gemäß Fig. 5 in vergrößertem Maßstab.

[0014] Die Landmaschine ist als aufgesattelte Sämaschine ausgebildet. Die Sämaschine weist einen Maschinenrahmen **1** auf, der über ein Fahrwerk **2** auf dem Boden abgestützt ist. Der Maschinenrahmen **1** weist auf seiner Vorderseite eine Zugvorrichtung **3** auf, die mit den Anhängevorrichtungen **4** des die Landmaschine ziehenden Schleppers **5** gekuppelt ist.

[0015] Auf der Rückseite des Maschinenrahmens **1** ist ein Tragrahmen **6** angeordnet. An diesem Tragrahmen **6** ist eine Arbeitseinheit **7** angeordnet. Die Arbeitseinheit **7** umfasst als Säschare **8** ausgebildete Bodenbearbeitungselemente mit zugeordneten Tiefenführung- und/oder Druckrollen **9**. Die als Säschare **8** ausgebildeten Bodenbearbeitungselemente sind im Ausführungsbeispiel in drei Querreihen mit Abstand zueinander hintereinander angeordnet. Die Bodenbearbeitungselemente **8** mit den zugeordneten Tiefenführungsrollen **9** sind jeweils mittels eines Haltearmes **10** mit einer Gelenkverbindung **11** in Höhenrichtung bewegbar an den beabstandet zueinander angeordneten Querbalken **12** des Tragrahmens **6** angeordnet. Die Bodenbearbeitungselemente **8** werden durch zwischen den Haltearmen **10** der Bodenbearbeitungselemente **8** und den Querbalken **12** angeordneten, nicht dargestellten Federelementen gegen den Boden **13** gedrückt. Diese Federelemente können beispielsweise als bekannte Gummilagerungen

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ausgebildet sein. Hierbei wird die Federkraft durch Verdrehen der verdrehbar am Tragrahmen **6** angeordneten Querbalken **12** mittels der als Hydraulikzylinder **14** ausgebildeten Stellmittel durch die Gummielemente aufgebracht.

[0016] Der Tragrahmen **6** ist mittels einer Gelenkanordnung **15** an den Maschinenrahmen **1** angebracht. Diese Gelenkanordnung **15** weist eine quer zur Fahrtrichtung **16** verlaufende Schwenkachse **17** auf. Weiterhin ist zwischen dem Tragrahmen **6** und dem Maschinenrahmen **1** zumindest eine als Hydraulikzylinder **18** ausgebildete motorische Stelleinrichtung angeordnet. Mittels dieses Hydraulikzylinders **18** ist der Tragrahmen **6** mit den daran angeordneten Bodenbearbeitungselementen **8** und zugeordneten Rollen **9** um die quer zur Fahrtrichtung **16** verlaufende Schwenkachse **18** zu verschwenken.

[0017] Wie die Fig. 1 und Fig. 2 zeigen wird beim Überfahren einer Bodenkuppe **19** nicht mehr sichergestellt, dass alle Säschare **8** in den Boden **13** eindringen bzw. gleichmäßig tief in den Boden **13** eindringen, um den Boden **13** zu bearbeiten bzw. das auszubringende Saatgut abzulegen, wie den Fig. 1 und Fig. 2 zeigen. In der darstellten Situation befindet sich der Maschinenrahmen **1** bzw. die durch die Tragbalken **12** gezogene Linie nicht mehr parallel zu der zu bearbeitenden Bodenoberfläche **13**. Aufgrund der Federanordnung werden die Säschare **8** zwar nach unten gedrückt, aber da der Tragrahmen **6** sich nicht parallel zur Bodenoberfläche befindet, kann er sich auch nicht der Form der Bodenoberfläche **13** anpassen.

[0018] Um hier Abhilfe zu schaffen muss der Tragrahmen **6** mittels des Hydraulikzylinders **18** um die durch die Gelenkanordnung **15** verlaufende Schwenkachse **17** verschwenkt werden, wie die Fig. 3 und Fig. 4 zeigen. Nach der Verschwenkung befindet sich der Tragrahmen **6** parallel zur zu bearbeitenden Bodenoberfläche **13**, so dass alle Säschare **8** gleich tief in den Boden **13** eindringen und die Rollen **9** mittels der Federkraft gegen den Boden **13** gedrückt werden.

[0019] Um dieses automatisch zu erreichen, ist jeweils einem Bodenbearbeitungselement **8** der vorderen Querreihe und der hinteren Querreihe ein Sensorelement **20** zur Erfassung der Auslenkung des Haltearmes **10** des Bodenbearbeitungselementes **8** gegenüber dem Tragrahmen **6** zugeordnet. Dieser Sensor **20** sendet Signale und Daten an einem auf dem Schlepper **5** angeordneten Bordcomputer **21**. In dem Speicher des Bordcomputers **21** ist ein Auswerteprogramm hinterlegt, mittels welchem die Steuerelemente der motorischen Stelleinrichtung 18 vom Bordcomputer **21** derart angesteuert werden, das durch Verschwenken des Tragrahmens **6** durch die Stelleinrichtung **18** die Auslenkung der Bodenbearbeitungselemente **8** der ersten Querreihe zumindest annähernd gleich der Auslenkung der Bodenbearbeitungselemente **8** der hinteren Querreihe gegenüber dem Tragrahmen **6** ist, wie die Fig. 3 und Fig. 4 zeigen. Mittels dieses Auswerteprogramms des Bordcomputers **21** und der Erfassung der Lage der Haltearme **10** der Bodenbearbeitungselemente **8** gegenüber dem Tragrahmen **6** ist während des gesamten Bearbeitungsvorganges die Lage des Tragrahmens **6** zu den Bodenbearbeitungselementen **8** und somit zur Kontur der Bodenoberfläche **13** einstellbar und die Auslenkung der Bodenbearbeitungselemente **8** der hinteren Querreihe gegenüber dem Tragrahmen **6** und die Auslenkung der Bodenbearbeitungselemente **8** gegenüber der ersten Querreihe zumindest annähernd gleich einzustellen und zu halten. Somit wird also eine gleichmäßige Eindingtiefe der Bodenbearbeitungselemente **8** bzw. der Säschare in den Boden **13** erreicht. Durch einen einfachen Abgleich der Winkelwerte zwischen den Bodenbearbeitungselementen **8** der ersten Querreihe und den Bodenbearbeitungselementen **8** der hinteren Querreihe gegenüber dem Tragrahmen **6** kann über die Einstellung des Tragrahmens **6** eine Anpassung an das Bodenniveau bzw. -verlauf in einfacher Weise erzielt werden.

[0020] In den Fig. 4 und Fig. 5 ist die Situation dargestellt, wenn die Landmaschine eine Senke **22** durchfährt. Auch hier erfolgt ein Verschwenken des Tragrahmens **6** über den Hydraulikzylinder **18** aufgrund der an den Bordcomputer **21** ausgewerteten Signale, so dass hier der Tragrahmen **6** entgegensetzt zu der Einstellung gemäß Fig. 3 und Fig. 4 verschwenkt wird.

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Zitierte Patentliteratur

- DE 102006034798 A1 [0002]

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Patentansprüche

1. Landmaschine, insbesondere aufgesattelte Sämaschine, mit einem Maschinenrahmen, der über ein Fahrwerk auf dem Boden abgestützt ist, sowie zumindest einer an einem Tragrahmen angeordneten Arbeitseinheit, umfassend Bodenbearbeitungselement mit zugeordneter Tiefenführungs- und/oder Druckrollen, wobei die Bodenbearbeitungselemente mit den zugeordneten Tiefenführungs- und/oder Druckrollen in Höhenrichtung bewegbar angeordnet und mittels Federelementen gegen den Boden gedrückt werden, wobei der Tragrahmen mittels einer Gelenkanordnung an dem Maschinenrahmen um eine quer zur Fahrtrichtung verlaufende Schwenkachse mittels einer motorischen Stelleinrichtung verschwenkbar angeordnet ist, wobei die Bodenbearbeitungselemente in zumindest zwei Querreihen beabstandet hintereinander angeordnet sind, **dadurch gekennzeichnet**, dass jeweils zumindest einem Bodenbearbeitungselement (**8**) der vorderen Querreihe und hinteren Querreihe jeweils ein Sensorelement (**20**) zur Erfassung der Auslenkung des Bodenbearbeitungselementen (**8**) gegenüber dem Tragrahmen (**6**) zugeordnet ist, dass der Landmaschine ein Bordcomputer (**21**) zugeordnet ist, dass die Sensorelemente (**20**) Signale an den Bordcomputer (**21**) übermitteln, dass die motorische Stelleinrichtung (**18**) vom Bordcomputer (**21**) aufgrund eines im Speicher des Bordcomputers (**21**) hinterlegten Auswerteprogramms derart ansteuerbar ist, dass durch Verschwenken des Tragrahmens (**6**) durch die Stelleinrichtung (**18**) die Auslenkung der Bodenbearbeitungselemente (**8**) der ersten Querreihe zumindest annähernd gleich der Auslenkung der Bodenbearbeitungselemente (**8**) der hinteren Querreihe gegenüber dem Tragrahmen (**6**) während des gesamten Bearbeitungsvorganges einstellbar und/oder zu halten ist.

2. Landmaschine nach Anspruch 1, dadurch gekennzeichnet, dass die Arbeitseinheit (**7**) eine Säeinheit mit zumindest einem Säschar (**8**) mit Tiefenführungs- und/oder Druckrolle (**9**) umfasst.

Es folgen 3 Blatt Zeichnungen

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Anhängende Zeichnungen

Fig.1

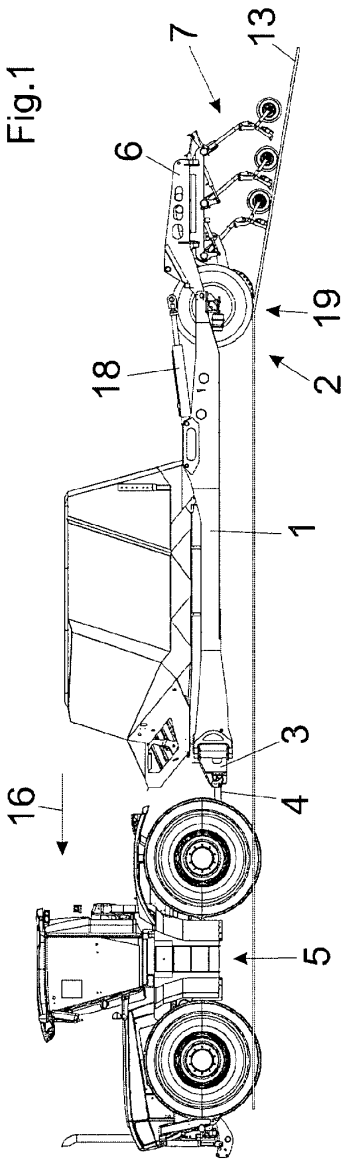
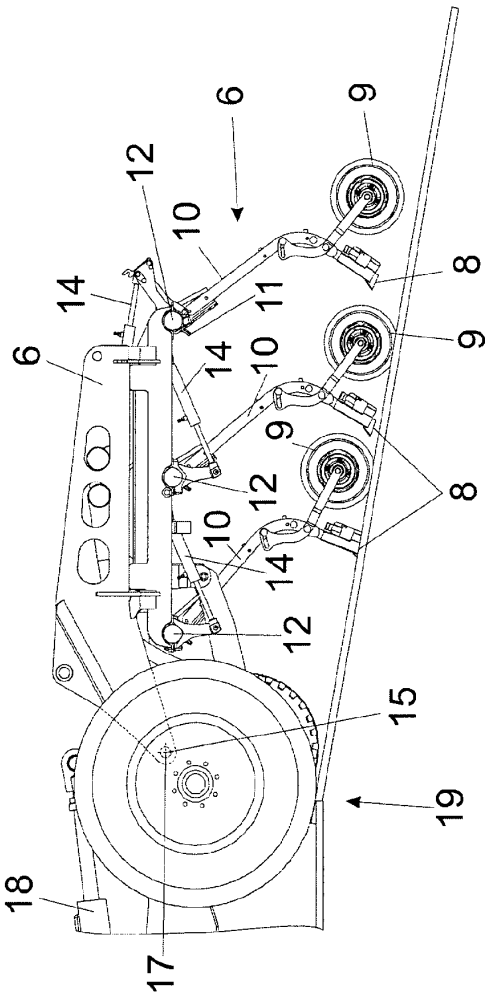


Fig.2



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Fig.3

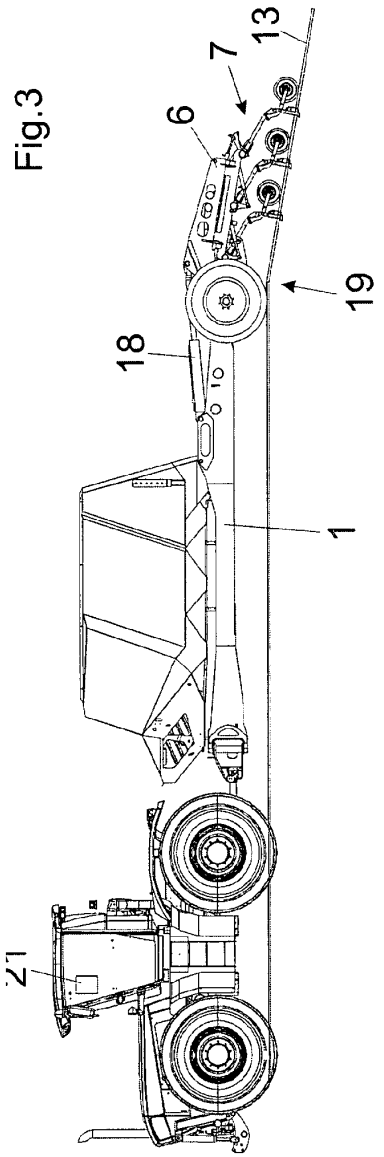
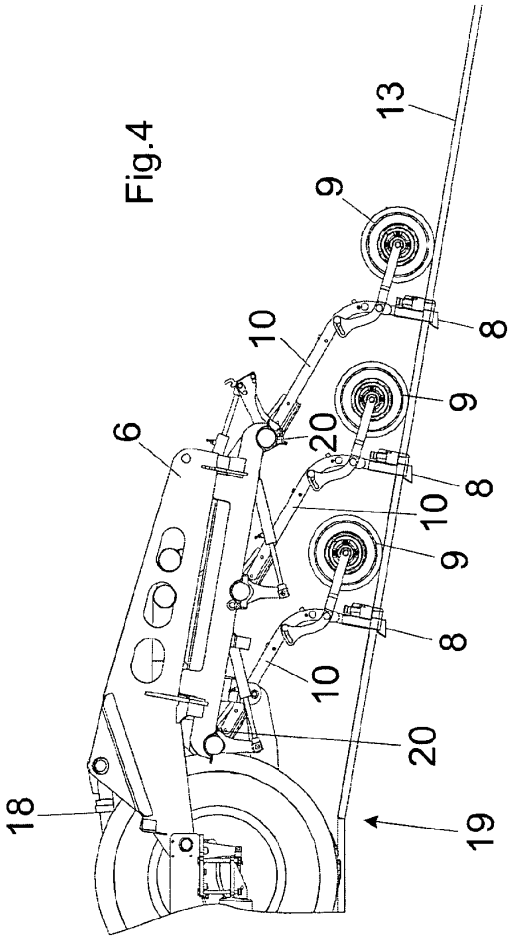


Fig.4



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Fig.5

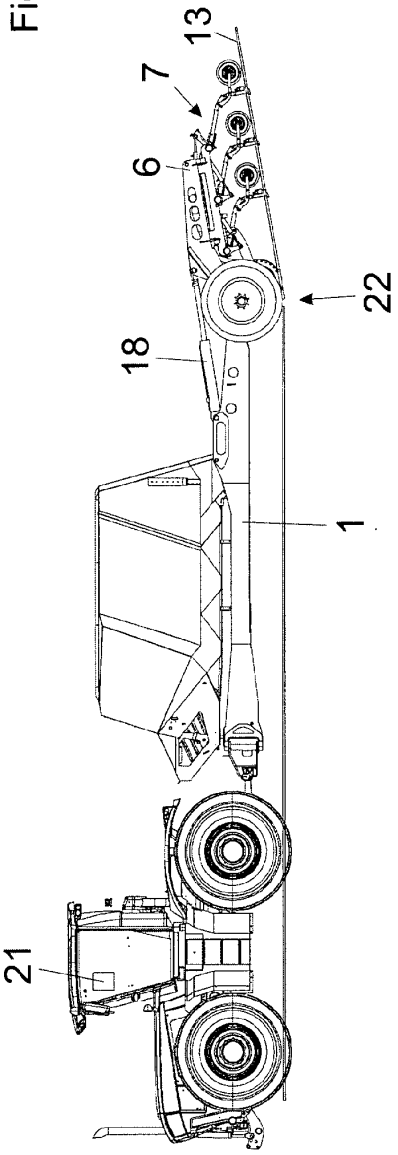
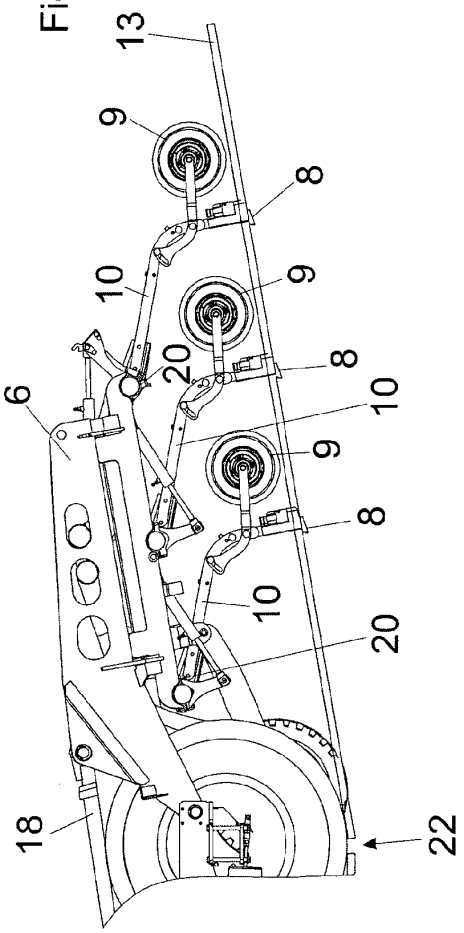


Fig.6



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First Named Inventor	Benjamin Anson FANSHIER
Art Unit	3671
Examiner Name	Jessica H. Lutz
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	Examiner Name	Jessica H. Lutz
	Attorney Docket Number	US16/40/WO/US-2

	1	INPI, Notice of 3rd Party Petition submitted for related Brazilian Patent Appliation No. BR112019010534-4, dated 17 JAN 2022, 30 pages.	X

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	Examiner Name	Jessica H. Lutz
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3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.H.L/

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	26	((("FANSHIER") near3 ("Benjamin")) OR (("SCHERTZ") near3 ("Rex"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	OFF	OFF	2021/06/18 10:07 AM
L2	15	("20020017090"|"20020017389"|"20080308020"|"20110120357"|"20110284252"|"20110315410"|"20120298388"|"20140069670"|"20140196996"|"20150156955"|"20150230391"|"4825958"|"5511623"|"6076611"|"6112827").PN.	(US-PGPUB; USPAT)	OR	OFF	OFF	2021/06/18 10:09 AM
L3	0	"2015289438"	(US-PGPUB; USPAT)	OR	OFF	OFF	2021/06/18 07:50 PM
L4	7	sauder.inv. and depth near sensing	(US-PGPUB; USPAT)	OR	OFF	OFF	2021/06/18 07:52 PM
L5	1078	(ground soil) with sens$3 with angle and (down near pressure actuator) and (frame tool toolbar)	(US-PGPUB; USPAT)	OR	OFF	OFF	2021/06/18 07:56 PM
L6	1418	(ground soil) with sens$3 with angle and (down near pressure actuator) and (frame tool toolbar)	(US-PGPUB; USPAT)	OR	ON	ON	2021/06/18 07:56 PM
L7	10	((ground soil) and sens$3 and angle and (cylinder actuator)and toolbar).clm.	(US-PGPUB; USPAT)	OR	OFF	OFF	2021/06/18 07:58 PM
L8	10	((ground soil) and sens$3 and angle and (cylinder actuator)and tool adj bar).clm.	(US-PGPUB; USPAT)	OR	OFF	OFF	2021/06/18 07:58 PM
L9	1	(14/623758).APP.	(USPAT; USOCR)	OR	OFF	OFF	2021/06/18 08:04 PM
L10	43	("20090301743" | "20120060731" | "20130032363" | "20130192186" | "20140048296" | "20140060862" | "20150230391" | "3673970" | "3749035" | "4044697" | "4176721" | "4353423" | "4377979" | "4422511" | "4444271" |	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2021/06/18 08:04 PM

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		"4506609" | "5479992" | "5499683" | "5590721" | "5640914" | "5653292" | "6085846" | "6971452" | "8201637" | "8235130" | "8448717" | "8534373" | "8573319" | "8577561" | "8601961" | "8657023" | "8857530" | "9232687").PN. OR ("9554504").URPN.					
L11	475	a01b63/114,102,1112,28.cpc.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2021/06/18 08:31 PM
L12	1	(12/783655).APP.	(USPAT; USOCR)	OR	OFF	OFF	2021/06/18 08:33 PM
L13	46	("20070163791" | "20080093093" | "20100025056" | "2595461" | "2605686" | "2715286" | "2918979" | "2958383" | "3752092" | "4158391" | "4519460" | "4763915" | "4821806" | "4867247" | "5042589" | "5234060" | "5669452" | "5868207" | "6305478" | "6378619" | "6698523" | "7478682" | "7581597").PN. OR ("8567517").URPN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2021/06/18 08:33 PM
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L15	21	toolbar and agricultur$2 and depth near sensing	(US-PGPUB; USPAT)	OR	OFF	OFF	2021/06/19 11:36 AM
L16	18	(US-20150230391-$ or US-20150289438-$ or US-20190373801-$ or US-20190021211-$ or US-20130112124-$ or US-20130112123-	(US-PGPUB; USPAT)	OR	OFF	OFF	2021/06/19 05:22 PM

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
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		$).did. or (US-6076611-$ or US-10561052-$ or US-10939604-$ or US-8857530-$ or US-8573319-$ or US-5653292-$ or US-5499683-$ or US-5479992-$ or US-10506756-$ or US-9930823-$ or US-9253937-$ or US-6378619-$).did.					
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L18	11	L16 not L17	(USPAT)	OR	OFF	OFF	2021/06/19 05:22 PM
L19	16	L16 not L17	(US-PGPUB; USPAT)	OR	OFF	OFF	2021/06/19 05:22 PM
L20	73	"8573319"	(US-PGPUB; USPAT)	OR	ON	ON	2021/10/23 04:12 PM
L21	2842	a01b63/114,102,1112,28.cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2022/07/15 07:04 AM
L22	118	"9301439"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2022/07/15 09:11 AM
L23	25	"9301439"	(USPAT)	OR	OFF	OFF	2022/07/15 09:11 AM
L24	713	a01b49/00.cpc.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2022/07/16 09:19 AM

L25	40	a01b63/045.cpc.	(US-PGPUB; USPAT)	OR	OFF	OFF	2022/07/16 09:20 AM
L26	4718	a01b63/008,10.cpc.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2022/07/16 09:21 AM
L27	1057	a01b49/00,027.cpc.	(US-PGPUB; USPAT)	OR	OFF	OFF	2022/07/16 09:22 AM
L28	48	((US-20200236873-A1 OR US-20180070523-A1 OR US-20170339819-A1 OR US-20210298215-A1 OR US-20130062083-A1 OR US-20200146201-A1 OR US-20200093052-A1 OR US-20220132720-A1).did. AND PGPB.dbnm.) OR ((US-10959367-B2 OR US-10820471-B2 OR US-9615500-B2 OR US-10925203-B2 OR US-10813265-B2 OR US-6263977-B1 OR US-10412875-B2 OR US-10412873-B2 OR US-11197408-B2 OR US-10368474-B2 OR US-10827665-B2 OR US-10537052-B2 OR US-10820470-B2 OR US-5590721-A OR US-9635797-B2 OR US-10368471-B2 OR US-9686899-B2 OR US-10602653-B2 OR US-9301439-B2 OR US-10405476-B2 OR US-9253937-B2 OR US-7921931-B2 OR US-10750653-B2).did. AND USPT.dbnm.) OR ((US-20180070523-A1 OR US-5653292-A OR US-20150012189-A1 OR US-20150053439-A1 OR US-20180116095-A1 OR EP-3501248-A1 OR US-20190150350-A1 OR US-20190021211-A1 OR	(US-PGPUB; USPAT; DERWENT; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS)	OR	OFF	OFF	2022/07/16 03:42 PM

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		US-20180295769-A1 OR US-20160134844-A1 OR DE-102017121152-A1 OR US-20140041563-A1 OR WO-2019010239-A1).did. AND DWPI.dbnm.) OR ((KR-102302749-B1 OR KR-20140104720-A).did. AND FTDB.dbnm.) OR ((KR-101423669-B1 OR DE-102009044898-A1).did. AND FPRS.dbnm.)					
L30	25	L28 AND sens$3	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2022/07/16 03:42 PM
L31	152	((US-20200084951-A1 OR US-20150230391-A1 OR US-20150156955-A1 OR US-20140196996-A1 OR US-20140069670-A1 OR US-20120298388-A1 OR US-20110315410-A1 OR US-20110284252-A1 OR US-20110120357-A1 OR US-20080308020-A1 OR US-20020017389-A1 OR US-20020017090-A1 OR US-20150289438-A1 OR US-20210051837-A1 OR US-20200344937-A1 OR US-20200100421-A1 OR US-20180014450-A1 OR US-20170006761-A1 OR US-20170006758-A1 OR US-20210037695-A1 OR US-20190373801-A1 OR US-20190021211-A1 OR US-20130112124-A1 OR US-20130112123-A1 OR US-20210095438-A1 OR US-20190075710-	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 06:13 PM

		A1 OR US-20200404837-A1 OR US-20200404830-A1 OR US-20200383260-A1 OR US-20200359562-A1 OR US-20200359559-A1 OR US-20140060862-A1 OR US-20140048296-A1 OR US-20130192186-A1 OR US-20130032363-A1 OR US-20120060731-A1 OR US-20090301743-A1 OR US-20100025056-A1 OR US-20080093093-A1 OR US-20200068783-A1 OR US-20190110392-A1 OR US-20190110391-A1 OR US-20190110388-A1 OR US-20200093052-A1 OR US-20200344939-A1 OR US-20210298215-A1 OR US-20200236873-A1 OR US-20130062083-A1 OR US-20200146201-A1 OR US-20220132720-A1 OR US-20210298217-A1 OR US-20170339819-A1 OR US-20180070523-A1).did. AND PGPB.dbnm.) OR ((US-6112827-A OR US-6076611-A OR US-5511623-A OR US-4825958-A OR US-10123475-B2 OR US-9554504-B2 OR US-10561052-B2 OR US-10939604-B2 OR US-10838432-B2 OR US-10701854-B2 OR US-9232687-B2 OR US-8857530-B2 OR US-8657023-B2 OR US-8577561-B2 OR US-8573319-B1 OR US-5653292-A OR US-5640914-A OR US-5590721-A OR US-5499683-A OR US-5479992-A OR US-					

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
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		4444271-A OR US-4353423-A OR US-5794421-A OR US-5065681-A OR US-4300638-A OR US-2622499-A OR US-8567517-B2 OR US-10537052-B2 OR US-10506756-B2 OR US-8657026-B2 OR US-10368471-B2 OR US-10342171-B2 OR US-10299423-B2 OR US-10021822-B2 OR US-9930823-B2 OR US-9253937-B2 OR US-9198341-B2 OR US-6378619-B2 OR US-4763915-A OR US-10813264-B2 OR US-10925203-B2 OR US-11382258-B1 OR US-1347992-A OR US-9301439-B2 OR US-2081346-A OR US-6263977-B1 OR US-10412873-B2 OR US-10405476-B2 OR US-10368474-B2 OR US-11234354-B2 OR US-11197408-B2 OR US-10645857-B2 OR US-4519460-A OR US-7921931-B2 OR US-9686899-B2 OR US-9635797-B2 OR US-11191204-B2 OR US-10492353-B2 OR US-10813265-B2 OR US-9615500-B2 OR US-10820470-B2 OR US-10820471-B2 OR US-10959367-B2 OR US-10602653-B2 OR US-10412875-B2 OR US-10624253-B2 OR US-10750653-B2 OR US-10827665-B2 OR US-11019762-B2 OR US-11140805-B2 OR US-11206753-B2).did. AND USPT.dbnm.) OR ((DE-102009044898-A1 OR DE-102016220489-A1 OR DE-822734-C OR DE-841068-C OR FR-2632484-A1 OR FR-660688-A OR KR-					

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
AGCO - Exhibit No. 2005
IPR2024-001459
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		101342396-B1 OR KR-101423669-B1).did. AND FPRS.dbnm.) OR ((DE-102017121152-A1 OR EP-3501248-A1 OR FI-96912-B OR US-20140041563-A1 OR US-20150012189-A1 OR US-20150053439-A1 OR US-20160134844-A1 OR US-20180070523-A1 OR US-20180116095-A1 OR US-20180295769-A1 OR US-20190021211-A1 OR US-20190150350-A1 OR US-5653292-A OR US-5709271-A OR WO-2012125109-A1 OR WO-2019010239-A1).did. AND DWPI.dbnm.) OR ((KR-102166055-B1 OR KR-102302749-B1 OR KR-200315786-Y1 OR KR-20140104720-A).did. AND FTDB.dbnm.)					
L32	17	L31 AND electromagnetic	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 06:14 PM
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L35	5	L31 AND rate WITH rotation	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD,	OR	ON	ON	2022/07/18 06:31 PM

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
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			DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L36	6	L31 AND speed WITH rotation	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 06:32 PM
L37	4	L31 AND (rate speed) WITH actuation	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 06:33 PM
L38	0	L33 AND (rate speed) WITH actuation	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 06:34 PM
L39	1	L33 AND (rate speed) WITH (rotation actuation)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 06:34 PM
L40	297	L26 AND (rate speed) WITH (rotation actuation)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 09:12 PM
L41	4	L33 AND sensor	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/18 11:13 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

To: patents@agcocorp.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 88988

Jul 28, 2022 04:38:01 AM

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Jeff Ellsworth
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Application	Document	Mailroom Date	Attorney Docket No.
16470472	CTNF	07/28/2022	US16/40/WO/US-2
	892	07/28/2022	US16/40/WO/US-2
	1449	07/28/2022	US16/40/WO/US-2

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16470472
Filing Date	2019-06-17
First Named Inventor	Fanshier, Benjamin Anson
Art Unit	3671
Examiner Name	Lutz, Jessica H.
Attorney Docket Number	US1640/WO-US

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5065681	A	1991-11-19	HADLEY	
	2	9031749	B2	2015-05-12	HUBALEK	

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	1	20030024450	A1	2003-02-06	JUPTNER	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	102006034798	DE	B4	2014-02-13	POETTINGER OHG ALOIS		☓
	2	2335465	EP	B1	2012-05-23	AMAZONEN WERKE DREYER H		☒

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	16470472
	Filing Date	2019-06-17
	First Named Inventor	Fanshier, Benjamin Anson
	Art Unit	3671
	Examiner Name	Lutz, Jessica H.
	Attorney Docket Number	US1640/WO-US

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	INPI, Notice of 3rd Party Petition submitted for related Brazilian Patent Application No. BR112019010534-4, dated 18 AUG 2022, 39 pages.	X

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	Application Number	16470472
	Filing Date	2019-06-17
	First Named Inventor	Fanshier, Benjamin Anson
	Art Unit	3671
	Examiner Name	Lutz, Jessica H.
	Attorney Docket Number	US1640/WO-US

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APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/470,472	**10/10/2022 06:34:47 PM ET**	**US16/40/WO/US-2**

Title of Invention

IMPLEMENT CONTOURING TOOLBAR

Application Information

APPLICATION TYPE	Utility - U.S. National Stage under 35 USC 371	PATENT #	-
CONFIRMATION #	1653	FILED BY	Wontu Bivins
PATENT CENTER #	61050945	FILING DATE	06/17/2019
CUSTOMER #	88988	FIRST NAMED INVENTOR	Benjamin Anson Fanshier
INTL. APPLICATION #	-	INTL. FILING DATE	-
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Nathan Whitlock

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
US1640WO-US_SUPP_IDS__.pdf	4	Information Disclosure Statement (IDS) Form (SB08)	1010 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
US1640WO-US_SUPP_IDS__.pdf	F37A478F88A0B7FCA7885148B689B7B6B721E6592739F10D24E9A48D7C4B9B84339E08E7B303FB6B7FD3B539506F9E2ACBE9FA289BD3D67B07F46B926F39A8E1

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agricultural machinery

Abstract

translated from German

The present invention relates to an agricultural machine, in particular saddled seeder, with a machine frame, which is supported on a chassis on the ground, and at least one working unit, in particular Säeinheit comprising Säschar and Tiefenführungs- and / or pressure roller, which is mounted vertically adjustable on the machine frame , Wherein the working unit is mounted vertically variable on a first four-bar link on a cross member, which in turn is mounted vertically adjustable via a second four-bar linkage on the machine frame. According to the invention, the agricultural machine is characterized in that the second four-bar linkage is designed in such a way that, during lifting movements of the second four-bar linkage, the transverse carrier undergoes a rotational movement which gives a section of the working unit which is more widely spaced from the traveling gear a greater lifting movement than one less distant from the traveling gear Section of the work unit.

Classifications

A01C7/208 Chassis, Coupling means to a tractor or the like; Lifting means; Side markers

View 3 more classifications

DE102006034798A1

Germany

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Other languages: German

Inventor: Hans-Jörg Dipl.-Ing. Preimess

Current Assignee : Poettinger Landtechnik GmbH

Worldwide applications

2006 DE 2007 AT FR SE

Application DE102006034798A events

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External links: Espacenet, Global Dossier, DPMA, Discuss

Claims (14)

Hide Dependent

translated from German

Agricultural machine, in particular semi-mounted seeder, with a machine frame (2), which has a chassis (3) is supported on the ground, and at least one working unit (9), in particular Säeinheit comprising Säschar (10 , 11) and depth guide and / or pressure roller (12 , 13) attached to the machine frame (2) is mounted vertically adjustable, wherein the working unit (9) via a first four-bar linkage (14) on a cross member (15) is mounted vertically variable, in turn, via a second four-bar linkage (23) on the machine frame (2) is mounted vertically variable, **characterized** in that the second four-bar linkage (23) is designed such that during lifting movements of the second four-bar linkage (23) the cross member (15) undergoes a rotational movement in the working position one of the chassis (3) further spaced section of the work unit (9) gives a greater stroke than one of the landing gear (3) less widely spaced section of the unit of work (9). Agricultural machine according to the preceding claim, wherein the second four-bar linkage (23) has a deviating from the parallelogram geometry. Agricultural machine according to one of the preceding claims, wherein the two machine frame-side pivot points (26 , 27) of the second four-bar linkage (23) have a smaller distance from each other than the two cross-member-side hinge points (28 , 29) of the second four-bar linkage (23). Agricultural machine according to the preceding claim, wherein the distance of the two machine frame side hinge points (26 , 27) about 0.6 to 0.95 times, preferably about 0.75 to 0.90 times the distance between the two cross-member-side hinge points (28 , 29) corresponds. Agricultural machine according to one of the preceding claims, wherein at least one of the two frame-side hinge points (26 , 27) of the second four-bar linkage (23) is adjustable and / or by an actuator (32) in different Positions can be brought and fixed. Agricultural machine according to the preceding claim, wherein the adjustable hinge point (26) of a hinge point guide, in particular one around the other machine frame side hinge point (27) of the second four-bar linkage (23) rotatable swivel arm (31), on a circular arc around the other frame-side hinge point (27) of the second four-bar linkage (23) is guided. Agricultural machine according to one of the preceding claims, wherein at least one handlebar (24) of the second four-bar linkage (23), which has a machine-frame-side hinge point (26) with a cross-member-side hinge point (28) of the second four-bar linkage (23) connects, is formed adjustable in length. Agricultural machine according to one of the preceding claims, wherein the first four-bar linkage (14) at least approximately forms a parallelogram. Agricultural machine according to one of the preceding claims, wherein the first and / or the second four-bar linkage (14 , 23) from a bottom pressure spring and / or adjusting device (35) can be acted upon, the spring force and / or hardness is adjustable. Agricultural machine according to the preceding claim, wherein the bottom pressure spring and / or adjusting device (35) in an excavating device (33) for lifting the work unit (9) is integrated. Agricultural machine according to the preceding claim, wherein the excavating device (33) and the Bodendruckfeder- and / or -einstelleinrichtung (35) Have a common multiply actuating cylinder unit, which is acted upon on the one hand by a excavation pressure and on the other hand by a Bodenanpressdruck. Agricultural machine according to the preceding claim, wherein the adjusting cylinder unit comprises a first pressure cylinder (34) for lifting the work unit (9) and a second impression cylinder (37) for influencing the soil contact pressure of the working unit (9), which by a common piston rod (36) are interconnected. Agricultural machine according to the preceding claim, wherein the impression cylinder (37) for influencing the soil contact pressure via a pressure circuit (41) with an accumulator (38), which has a filling / discharge connection (39), which can be shut off by a shut-off valve and has connection means for connection to a tractor-side hydraulic pressure supply. Agricultural machine according to claim 12, wherein the impression cylinder (37) can be connected to a controllable pressure supply for influencing the ground contact pressure, a sensor device for detecting an actual value of the ground contact pressure of the working unit (9) is provided and by an electronic control device, the pressure supply in response to a signal of the sensor device is controlled.

Description

translated from German

The The present invention relates to an agricultural machine, in particular a mounted seed drill, with a machine frame over a landing gear is supported on the ground, as well as at least one Working unit, in particular Säeinheit comprising at least a coulter and a depth-leading or pressure roller which is mounted vertically adjustable on the machine frame, wherein the work unit over a first four-bar link is mounted vertically adjustable on a cross member, the turn over a second four-bar linkage is mounted vertically adjustable on the machine frame.

Especially in seed drills, but also in other agricultural machines, the working units with a predetermined ground pressure resting on the ground or to work the soil at a certain depth, the ground adjustment of the working units is a difficult to solve aspect, especially when the terrain kupiert with valleys and hills is or otherwise has uneven course. This problem is exacerbated in the direction of travel a greater engagement length having work units, as is the case with multi-row sowing units staggered several coulters behind each other and trailing or leading arranged ground pressure rollers, since the ground is not at a point or a line, but at in the direction of travel one behind the other several points is touched. In order to achieve even ground contact pressure or a constant depth of engagement even on uneven ground, various suspensions for the sowing unit with more or less complex kinematics have already been proposed in seed drills. That's how it shows DE 199 47 991 A1 a saddled seed drill in which the actual sowing unit with coulters and depth guide roller is mounted on a crossbar via a first parallelogrammartiges four-bar, which is mounted vertically adjustable via a second link assembly on the semitrailer frame and can be excavated by means of a hydraulic cylinder to lift the sowing unit from the ground. The Säeinheit runs behind the wheels of the chassis of the Aufsattelrahmens and hereby projects quite a considerable distance to the rear over the contact point of the chassis of the Aufsattelrahmens. The kinematics is made such that during an upward movement, the front running depth control roller is raised a little more than the trailing coulters. Even if a certain ground adaptation is achievable with the double articulation provided with this seeder, it reaches its limits with steeply inclined slope edges or bumps. A similar sowing machine shows the WO 2006/031182 A1 in which the actual sowing unit with coulter and depth control roller is suspended via a parallelogrammic four-bar linkage on a cross member, which can be pivoted by an actuator in the form of a threaded spindle or a hydraulic cylinder in order to increase the height adjustment range of the sowing unit can. Although this allows a better presetability of the work area on different soils or other parameters, the aforementioned problem of ground adaptation to steeper slope edges or bumps is not solved by this.

Of the The present invention is therefore based on the object, an improved Agricultural machine of the type mentioned above to create the disadvantages of the prior art avoids and the latter in an advantageous manner Way further education. In particular, an improved ground adaptation even with coarser ones Uneven floors can be achieved.

According to the invention this Problem solved by an agricultural machine according to claim 1. preferred Embodiments of the invention are the subject of the dependent claims.

It It is therefore proposed, at least the second four-bar linkage, over the the height-adjustable cross member on the machine frame suspended is, from the usual Parallelogram training deviating to form a better High / low movement of the working unit adapted to inclined ground contours to reach. According to the invention, the second Viergelenk designed such that during lifting movements of the second Four joints of the crossmember one Rotational movement experiences, the one further spaced from the chassis of the machine frame Section of the work unit gives a greater lift than one from the said chassis less widely spaced portion the work unit. The kinematics of the second four-joint is so such that at one of the chassis of the machine frame trailing arranged Säeinheit the part further to the back is raised more than the one further ahead, closer part lying on the chassis. This leads to an improved ground adaptation especially when the chassis of Aufsattelrahmens the dome one stronger reached after a gradual increase in ground or after passing over a more inclined downwards Bump or slope reaches the sole, as in the former case the parts further back, which the dome has not yet reached have, stronger are lowered while in the second case the rear parts, the sole not yet have achieved even stronger are raised. In addition, a greater ground clearance, in particular with regard to the drivable slope angle, achieved when the second four-bar linkage for lifting the stored thereon Work unit is used.

In a further development of the invention is the ge called second four-bar adjustable trained to make the thus made possible ground adaptation variable. In particular, at least one of the two machine-frame-side hinge points of the second four-bar linkage can be designed to be adjustable, advantageously an actuator being assigned to this adjustable pivot point in order to bring the steering point into different positions and to hold it there. As a result, in particular, a working depth adjustment, ie, when setting up the agricultural machine as a seed drill, a sowing depth adjustment can be effected.

advantageously, Here is the said adjustable machine frame side hinge point of the second four-bar linkage so adjustable that the geometry of the second four-joint does not change in itself and that of the second Four-joint in the aforementioned manner caused kinematics of the high / low movement preserved. In an advantageous embodiment of the invention this for the adjustable machine frame side hinge point a guide device provided that the said pivot point during its adjustment on a circular path around the other machine frame side hinge point of the second four-bar linkages. This pivot point guide can basically be formed differently, for example, from a backdrop-like acting guide groove exist, in which said pivot point is displaceable. advantageously, however, the adjustable, machine frame-side hinge point attached to a pivot arm, which is around the other machine frame side Hinge point of the second four-bar linkage is pivotally mounted. hereby no geometry change occurs of the four-joint in itself, when said machine-frame-side Moving point is moved, rather, the second four-bar linkage pivoted as such up or down, creating a corresponding working depth adjustment can be effected. The in joint movements caused ground adjustment movement of it attached cross member and the working unit attached to it remains intact.

Around in the aforementioned manner in high / low movements of the second four-jointed the mounted cross member impose a pivotal movement, in the desired Make different sections of the attached work unit different levels of raising or lowering, can basically different training of the Four-joint find use. In a particularly simple way can the desired Kinematics be achieved by the two machine frame side Hinges of the second four-joint a smaller distance from each other have as the two cross beam side Hinges of the second four-jointed joint. The corresponding handlebars of the four-joint so spread apart so to speak of the machine frame away to the crossbeam slightly open, which in a middle position roughly speaking lying orientation of the two links of the four-bar linkage the desired tilting movement of the crossbeam and the attached working unit is effected. Depending on, How strong is the lifting movement? the length to change the work unit, can the mentioned distance ratio the machine frame side hinge points on the one hand and the cross member side On the other hand, hinge points can be chosen differently. According to an advantageous embodiment of Invention may be said distance of the two machine frame side Joint points of the second four-joint approximately in the range of 0 6 to 0.95 times the distance between the two cross member side pivot points from each other lie, wherein according to an advantageous embodiment of the distance between the two Machine-frame-side hinge points about 0.75 to 0.90 times the distance between the two cross member side Fulcrum points is.

Around to achieve a further improved variability of the soil adaptation, is a handlebar of said second four-bar linkage, which is a machine-frame side Hinge point with a cross beam side Fulcrum connects, adjustable in length. The handlebar can be designed to be telescopic or a slidable in a longitudinal guide Fastening device for own one of the hinge points. According to a preferred embodiment of Invention, the handlebar is a longitudinally adjustable Include threaded spindle. Alternatively, a pressure-actuated cylinder unit may be provided be, which is detectable in different positions, for example by blocking the hydraulic inflow and outflow.

The first four-bar link, through which the working unit itself to the adjustable cross member is suspended, can basically be formed differently. According to a preferred embodiment of Invention forms the first four-bar linkage at least approximately a parallelogram, so that the work unit opposite the crossbeam Perform up and down movements can without experiencing any significant rotation.

in a further development of the invention, the two four-bar linkages are not freely movable or the working unit suspended from the first four-bar linkage is not biased downwards by its own weight towards the ground. In a further development of the invention, the first and / or the second four-bar linkage is assigned a ground pressure setting and / or spring device which acts on the respective four-bar link with a specific force, in particular spring force, in order to influence, ie increase, the ground contact pressure of the working unit. or minimize. In order to achieve the latter, part of the dead weight of the sowing unit is, as it were, scooped off conditions, while in the opposite case, the four-bar is pressed down to increase the contact pressure.

In Advantageous development of the invention is the first and / or second four-joint acting force of the ground pressure adjustment and / or Pressure device adjustable to the necessary Bodenanpresskraft to the respective conditions, in particular the soil condition or the job to be done.

Around to create a particularly compact arrangement with few components is according to an advantageous embodiment of the invention, the said ground pressure adjustment device integrated in an excavating device, by means of which the working unit of Floor can be raised. The said excavating device can in particular have a multiply actuating cylinder unit, on the one hand by a excavation pressure and on the other hand with a Bodenanpressdruck or soil relief pressure can be acted upon.

Regarding the formation of said adjusting cylinder unit can be an advantageous Execution in it consist of two pressure cylinders, one of which is for lifting the working unit provided in a headland position and / or a transport position and the other to relieve weight and / or increase the Ground pressure of the working unit in the lowered, above the Floor guided Working position is provided by a common piston rod together are connected. The two hydraulic cylinders share, so to speak a piston rod and each sit on the common piston rod, so that they form a unit connected in series. The Both pressure cylinders are interconnected by the common piston rod connected to both the one and the other impression cylinder retract and extend. Advantageously, by the use of two such separate printing cylinders on one common piston rod commercially available, prefabricated cylinder Find use, so no custom made necessary are.

advantageously, engages the thus formed bottom pressure adjusting device and excavating device on the second four-joint, so that the the first four-bar link and the working unit carrying cross member on the one hand into a headland or Transport position can be excavated and on the other hand of the zweizylindrig formed adjusting cylinder unit only relieved or pressed down can be used to adjust the ground contact pressure in the working position the desired To ensure height.

The Handlebar of the first four-bar link connecting the working unit to the crossbar are advantageously spring-loaded and / or spring-loaded, so they move from a neutral position to a defined one Spring force are deflectable. In a preferred embodiment of the invention, the handlebar the first four-bar linkage be stored in rubber bearings, the cross-member side Form hinge of the respective arm or are integrated in this.

The Arrangement of the working unit relative to the machine frame can in principle be met differently. According to a preferred embodiment of Invention is the cross member the running gear of the machine frame arranged trailing, wherein preferably in turn the work unit trailing the said cross member is arranged.

at Training the agricultural machine as a seeder includes the work unit Advantageously, at least one coulter or a coulter row as well as at least one and / or pressure roller, advantageously the said at least one coulter trailing arranged. The depth guide and / or pressure roller This can be divided into individual roller sections in the manner of a packer roller be arranged coaxially with each other. In a preferred embodiment of Invention can also in the direction of travel offset each other several Säscharreihen be arranged, wherein at least one Tiefenführungs- or pressure roller provided is.

Especially advantageous is the described suspension of the working unit a semi-trailer usable. The machine frame forms an Aufsattelrahmen, the is supported by the said landing gear on the ground and on the said two four-joint carries the work unit.

The Invention will be described below with reference to a preferred embodiment and associated Drawings closer explained. In the drawings show:

1 FIG. 2: a side view of a semi-mounted seed drill according to a preferred embodiment of the invention in a working position on a level ground, FIG.

2 : a side view of the seeder off 1 with the sowing unit in an upwardly deflected position,

3 3 is a side view of the seed drill of the preceding figures, showing the sowing unit in a downwardly deflected position, and FIG

4 : An enlarged side view of the Säeinheit and this stored first four-bar linkage.

The drawn in the figures seeder 1 includes a machine frame 2 that has a landing gear 3 , which is uniaxial in the drawn embodiment and wheels 4 has supported on the ground. The machine frame 2 is about a drawbar 5 attachable to a tractor not shown, by means of a coupling piece 6 at the front end of the drawbar, which pivoting the drawbar 5 allowed to an upright pivot axis. In the illustrated embodiment includes the drawbar 5 Moreover, a front drawbar section 5a , which has a rear filler section 5b around a horizontal transverse axis 7 pivotally connected so that the inclination of the machine frame 2 regardless of the height of the tractor-side coupling piece by bending the drawbar about the transverse axis 7 by means of an actuator 8th is adjustable.

At the rear end of the machine frame 2 is a segregation unit 9 attached to the landing gear 3 trailing arranged. Although not shown in the drawings, the chassis can 3 leading at least one further working unit, such as a disc harrow or the like, provided and on the machine frame 2 be stored.

The said Säeinheit 9 comprises in the illustrated embodiment, two successively arranged Säscharreihen 10 and 11 , each trailing depth guide rollers 12 and 13 assigned. Behind the depth control rollers 12 and 13 is also a soil post-processing device in the form of a harrow 42 intended.

The sowing unit 9 is about a first four-bar linkage 14 at one of the landing gear 3 trailing cross member 15 hinged so that the sowing unit 9 opposite the cross member 15 is movable up and down. As the 1 and 4 show is the first four-bar linkage 14 formed substantially parallelogram-like. It comprises two approximately parallel, horizontally arranged, slightly sloping backwards in an undeflected operating position handlebars 16 and 17 , on the one hand to a respective cross-member-side hinge point 18 respectively. 19 (see. 4) lying transverse axes pivotally mounted on the cross member 15 hinged and on the other hand säscharträgerseitigen hinge points 20 respectively. 21 Pivotable transverse axes with a Säscharträger 22 are connected to the coulters, the depth control rollers and the harrow device are attached.

As 4 shows are the hinge points 19 and 21 of the lower handlebar 17 designed as Gummigelenklager, which are rotatory deflected from a starting position in both directions and thereby generate elastic restoring forces to the starting position back. The aforementioned rubber bearings form insofar a spring device, which is the first four-bar linkage 14 tried and put it back in a starting position, if it was deflected. In addition, the aforementioned rubber bearings naturally also form a damping device which is able to dampen impacts introduced on the coulters or the depth control rollers.

The crossbeam 15 at which said first four-bar linkage 14 is struck, is how 1 shows, through a second four-bar linkage 23 on the machine frame 2 hinged. This second four-bar linkage 23 has a geometry deviating from a parallelogram. In the illustrated embodiment, the two handlebars 24 and 25 of the second four-bar joint 23 in one to the sowing unit 9 towards slightly diverging arrangement provided. The two machine frame side hinge points 26 and 27 in which each one of the handlebars 24 and 25 hinged, have a slightly smaller distance from each other than the two cross-member-side hinge points 28 and 29 at one with the cross member 15 rotatably connected cross member arm 30 are provided. The two handlebars have 24 and 25 a comparable with each other, ie about the same length, but with one of the two links - in the illustrated embodiment of the upper link 24 - is formed variable in length to allow adjustability of the geometry of the second four-bar linkage. The two handlebars 24 and 25 are - roughly speaking - arranged approximately lying, whereby they fall slightly backwards in the undeflected working position, in turn, the lower arm 25 arranged more sloping.

To a working depth adjustment without changing the geometry of the four-bar linkage 23 to be able to make, is the upper machine frame side hinge point 26 adjustable. As 1 shows is the upper machine frame side hinge point 26 on a swivel arm 31 provided on the machine frame 2 is pivotally articulated about a transverse axis, with the lower machine frame side hinge point 27 flees. As a result, the upper machine frame side pivot point 26 on a circular path around the lower frame-side hinge point 27 be pivoted. This is an actuator 32 provided on the swivel arm 31 and on the other hand on the machine frame 2 is hinged and in the illustrated embodiment consists of a variable length screw. Will this actuator 32 shortened, becomes the second four-bar linkage 23 pivoted in otherwise unchanged geometry such that the cross member 15 is raised slightly. Conversely, by extension of the actuator 32 the crossbeam 15 be lowered.

For lifting the sowing unit 19 is an excavation device 33 provided a pressure cylinder 34 includes, on the one hand on the machine frame 2 and on the other hand on one of the handlebars 25 of the second four-bar joint 23 engages to pivot the four-bar linkage upwards and thus the sowing unit 9 from the ground.

In the excavation device 33 is still a ground pressure adjustment device 35 integrated, which is a pressure cylinder 37 comprising, advantageously on the same piston rod 36 sits, on the also the printing cylinder 34 the excavating device 33 sitting. The two impression cylinders 34 and 37 sit on opposite ends of the common piston rod 36 and may each be designed as a single-acting cylinder.

The pressure acting on the soil pressure impression cylinder 37 is advantageously how 1 shows, with a pressure accumulator 38 connectable, the pressure cylinder 37 subjected to an appropriate pressure to the Bodenanpressung the Säeinheit 9 to achieve the desired level. Advantageously, this is in the pressure accumulator 38 or the associated pressure circuit prevailing pressure adjustable. This can be done for example by a valve 39 connectable pump 40 be achieved.

This results in the following function: In the in 1 shown operating position on level ground can by changing the length of the actuator 32 and / or by changing the length of the upper link 24 of the second four-bar joint 23 the sowing depth of the sowing unit 9 be set. By adjusting the preload pressure in the impression cylinder 38 the soil pressure can be varied.

As 2 shows, the sowing unit 9 when entering a soil trough opposite the machine frame 2 Swing up to follow the sloping contour of the bottom tray. Advantageously, in this case, if the second four-bar linkage 23 swings upwards, which takes place especially when driving over larger unevenness, that of the depth guide rollers 12 and 13 formed, further back part of the sowing unit 9 raised higher than that of the coulters 10 and 11 formed further forward of the Säeinheit 9 ,

Conversely, the sowing unit 9 when driving onto a ground elevation opposite the machine frame 2 fall. Here, the said rear part of the Säeinheit 9 lowered more than the front part of the sowing unit 9 , whereby an overall improved ground adaptation is achieved.

The advantage here is the combination of the substantially parallelogram-shaped first four-bar linkage 14 with the deviating from the parallelogram second four-bar linkage 23 , Smaller ground adjustments can be made by pivoting the first four-bar linkage 14 take place, with a uniform lifting and lowering of the sowing unit 9 he follows. If, on the other hand, larger bumps are run over, the adjustment movement comes through the second four-bar linkage 23 added, which provides in the said manner, an increased raising or lowering of the rear Säeinheitsabschnitts.

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DE102004008089A1 *	2004-02-19	2005-09-08	Rabe Agrarsysteme Gmbh & Co. Kg	Mulch seeder has depth adjusting wheel mounted on parallelogram lever system and attached to connecting rods linking it to seeding disks so that angle between ground surface and disk mounting remains constant for depths up to 6 cm
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Priority And Related Applications

Priority Applications (1)

Application	Priority date	Filing date	Title
[illegible]	[illegible]	[illegible]	[illegible]

DE102006034798.6A	2006-07-27	2006-07-27	agricultural machinery

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Application	Filing date	Title
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Legal Events

Date	Code	Title	Description
2008-02-14	OR8	Request for search as to paragraph 43 lit. 1 sentence 1 patent law	
2013-09-26	R012	Request for examination validly filed	**Effective date**: 20130718
2013-10-18	R018	Grant decision by examination section/examining division	
2014-11-14	R020	Patent grant now final	
2015-02-05	R020	Patent grant now final	**Effective date**: 20141114
2017-02-23	R081	Change of applicant/patentee	**Owner name**: POETTINGER LANDTECHNIK GMBH, AT **Free format text**: FORMER OWNER: ALOIS POETTINGER MASCHINENFABRIK GMBH, GRIESKIRCHEN, AT
2017-02-23	R082	Change of representative	**Representative=s name**: LORENZ SEIDLER GOSSEL RECHTSANWAELTE PATENTANW, DE

Concepts

machine-extracted

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basement excavation		claims,description	4	0.000
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(71) Anmelder:
Alois Pöttinger Maschinenfabrik GmbH, Grieskirchen, AT

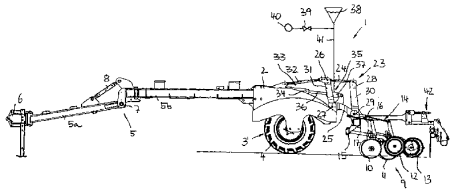
(74) Vertreter:
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(72) Erfinder:
Preimeß, Hans-Jörg, Dipl.-Ing., Lendorf, AT

Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

(54) Bezeichnung: **Landmaschine**

(57) Zusammenfassung: Die vorliegende Erfindung betrifft eine Landmaschine, insbesondere aufgesattelte Sämaschine, mit einem Maschinenrahmen, der über ein Fahrwerk auf dem Boden abgestützt ist, sowie zumindest einer Arbeitseinheit, insbesondere Säeinheit, umfassend Säschar und Tiefenführungs- und/oder Druckrolle, die an dem Maschinenrahmen höhenveränderbar gelagert ist, wobei die Arbeitseinheit über ein erstes Viergelenk an einem Querträger höhenveränderlich gelagert ist, der wiederum über ein zweites Viergelenk an dem Maschinenrahmen höhenveränderlich gelagert ist. Erfindungsgemäß zeichnet sich die Landmaschine dadurch aus, dass das zweite Viergelenk derart ausgebildet ist, dass bei Hubbewegungen des zweiten Viergelenks der Querträger eine Drehbewegung erfährt, die einem von dem Fahrwerk weiter beabstandeten Abschnitt der Arbeitseinheit eine größere Hubbewegung gibt als einem von dem Fahrwerk weniger weit beabstandeten Abschnitt der Arbeitseinheit.



Beschreibung

[0001] Die vorliegende Erfindung betrifft eine Landmaschine, insbesondere eine aufgesattelte Sämaschine, mit einem Maschinenrahmen, der über ein Fahrwerk auf dem Boden abgestützt ist, sowie zumindest einer Arbeitseinheit, insbesondere Säeinheit umfassend zumindest eine Säschar und eine Tiefenführungs- bzw. Druckrolle, die an dem Maschinenrahmen höhenveränderlich gelagert ist, wobei die Arbeitseinheit über ein erstes Viergelenk an einem Querträger höhenveränderlich gelagert ist, der wiederum über ein zweites Viergelenk an dem Maschinenrahmen höhenveränderlich gelagert ist.

[0002] Insbesondere bei Sämaschinen, jedoch auch bei anderen Landmaschinen, deren Arbeitseinheiten mit einem vorbestimmten Bodendruck auf dem Boden aufliegen oder in einer bestimmten Tiefe den Boden bearbeiten sollen, ist die Bodenanpassung der Arbeitseinheiten ein schwierig zu lösender Aspekt, insbesondere wenn das Gelände mit Senken und Hügeln kupiert ist oder einen anderweitig unebenen Verlauf besitzt. Diese Problematik verschärft sich bei in Fahrtrichtung eine größere Eingriffslänge aufweisenden Arbeitseinheiten, wie dies bei mehrreihigen Säeinheiten der Fall ist, die mehrere Säschare hintereinander gestaffelt sowie nachlaufend oder vorlaufend angeordnete Bodendruckrollen aufweisen, da hier der Boden nicht an einem Punkt bzw. einer Linie, sondern an in Fahrtrichtung hintereinander mehreren Punkten berührt wird. Um auch bei unebenem Boden einen möglichst gleichmäßigen Bodenanpressdruck bzw. eine gleich bleibende Eingriffstiefe zu erreichen, wurden bei Sämaschinen bereits diverse Aufhängungen für die Säeinheit mit mehr oder minder komplexen Kinematiken vorgeschlagen. So zeigt die DE 199 47 991 A1 eine aufgesattelte Sämaschine, bei der die eigentliche Säeinheit mit Säscharen und Tiefenführungswalze über ein erstes parallelogrammartiges Viergelenk an einem Querträger gelagert ist, der über eine zweite Lenkeranordnung an dem Aufsattelrahmen höhenverstellbar gelagert ist und mittels eines Hydraulikzylinders ausgehoben werden kann, um die Säeinheit vom Boden abzuheben. Die Säeinheit läuft dabei hinter den Rädern des Fahrwerks des Aufsattelrahmens und kragt hierbei ein durchaus beträchtliches Stück nach hinten über den Aufstandspunkt des Fahrwerks des Aufsattelrahmens aus. Die Kinematik ist dabei derart getroffen, dass bei einer Aufwärtsbewegung die vorne laufende Tiefenführungsrolle ein wenig stärker angehoben wird als die nachlaufenden Säschare. Auch wenn mit der bei dieser Sämaschine vorgesehenen doppelten Gelenkigkeit eine gewisse Bodenanpassung erreichbar ist, stößt diese bei steiler geneigten Hangkanten oder Bodenwellen an ihre Grenzen. Eine ähnliche Sämaschine zeigt die WO 2006/031182 A1, bei der die eigentliche Säeinheit mit Säschar und Tiefenführungsrolle über ein parallelogrammartiges Viergelenk an einem Querträger aufgehängt ist, der durch ein Stellglied in Form einer Gewindespindel bzw. eines Hydraulikzylinders verschwenkt werden kann, um den Höhenverstellbereich der Säeinheit vergrößern zu können. Dies ermöglicht zwar eine bessere Voreinstellbarkeit des Arbeitsbereiches auf verschiedene Böden bzw. andere Parameter, die zuvor genannte Problematik der Bodenanpassung an steilere Hangkanten bzw. Bodenwellen wird hierdurch nicht gelöst.

[0003] Der vorliegenden Erfindung liegt daher die Aufgabe zugrunde, eine verbesserte Landmaschine der eingangs genannten Art zu schaffen, die Nachteile des Standes der Technik vermeidet und letzteren in vorteilhafter Weise weiterbildet. Insbesondere soll eine verbesserte Bodenanpassung auch bei gröberen Bodenunebenheiten erreicht werden.

[0004] Erfindungsgemäß wird diese Aufgabe durch eine Landmaschine gemäß Anspruch 1 gelöst. Bevorzugte Ausgestaltungen der Erfindung sind Gegenstand der abhängigen Ansprüche.

[0005] Es wird also vorgeschlagen, zumindest das zweite Viergelenk, über das der höhenbewegliche Querträger am Maschinenrahmen aufgehängt ist, von der üblichen Parallelogrammausbildung abweichend auszubilden, um eine besser an geneigte Bodenkonturen angepasste Hoch-/Tiefbewegung der Arbeitseinheit zu erreichen. Erfindungsgemäß ist das zweite Viergelenk derart ausgebildet, dass bei Hubbewegungen des zweiten Viergelenks der Querträger eine Drehbewegung erfährt, die einem von dem Fahrwerk des Maschinenrahmens weiter beabstandeten Abschnitt der Arbeitseinheit eine größere Hubbewegung gibt als einem von dem genannten Fahrwerk weniger weit beabstandeten Abschnitt der Arbeitseinheit. Die Kinematik des zweiten Viergelenks ist also derart beschaffen, dass bei einer dem Fahrwerk des Maschinenrahmens nachlaufend angeordneten Säeinheit der weiter hinten liegende Teil stärker angehoben wird als der weiter vorne, näher beim Fahrwerk liegende Teil. Dies führt zu einer verbesserten Bodenanpassung insbesondere dann, wenn das Fahrwerk des Aufsattelrahmens die Kuppe eines stärker geneigten Bodenanstiegs erreicht oder nach Überfahren einer stärker abwärts geneigten Bodenwelle oder Hangkante die Sohle erreicht, da im ersteren Fall die weiter hinten liegenden Teile, die die Kuppe noch nicht erreicht haben, stärker abgesenkt sind, während im zweiteren Falle die hinteren Teile, die die Sohle noch nicht erreicht haben, noch stärker angehoben sind. Zudem wird eine größere Bodenfreiheit, insbesondere hinsichtlich des befahrbaren Böschungswinkels, erreicht, wenn das zweite Viergelenk zum Ausheben der daran gelagerten Arbeitseinheit genutzt wird.

[0006] In Weiterbildung der Erfindung ist das ge-

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nannte zweite Viergelenk verstellbar ausgebildet, um die hierdurch ermöglichte Bodenanpassung variabel zu gestalten. Insbesondere kann zumindest einer der beiden maschinenrahmenseitigen Gelenkpunkte des zweiten Viergelenks verstellbar ausgebildet sein, wobei vorteilhafterweise ein Stellglied diesem verstellbaren Gelenkpunkt zugeordnet ist, um den Gelenkpunkt in verschiedene Positionen zu bringen und dort zu halten. Hierdurch kann insbesondere eine Arbeitstiefeneinstellung, d.h. bei Ausbildung der Landmaschine als Sämaschine eine Sätiefeneinstellung bewirkt werden.

[0007] Vorteilhafterweise ist hierbei der genannte verstellbare maschinenrahmenseitige Gelenkpunkt des zweiten Viergelenks derart verstellbar, dass sich die Geometrie des zweiten Viergelenks in sich nicht ändert und die von dem zweiten Viergelenk in der vorgenannten Weise bewirkte Kinematik der Hoch-/Tiefbewegung erhalten bleibt. In vorteilhafter Weiterbildung der Erfindung ist hierzu für den verstellbaren maschinenrahmenseitigen Gelenkpunkt eine Führungseinrichtung vorgesehen, die den genannten Gelenkpunkt bei seiner Verstellung auf einer Kreisbahn um den anderen maschinenrahmenseitigen Gelenkpunkt des zweiten Viergelenks führt. Diese Gelenkpunktführung kann grundsätzlich verschieden ausgebildet sein, beispielsweise aus einer kulissenartig wirkenden Führungsnut bestehen, in der der genannte Gelenkpunkt verschiebbar ist. Vorteilhafterweise jedoch ist der verstellbare, maschinenrahmenseitige Gelenkpunkt an einem Schwenkarm befestigt, der um den anderen maschinenrahmenseitigen Gelenkpunkt des zweiten Viergelenks schwenkbar gelagert ist. Hierdurch tritt keine Geometrieänderung des Viergelenks in sich auf, wenn der genannte maschinenrahmenseitige Gelenkpunkt verschoben wird, vielmehr wird das zweite Viergelenk als solches nach oben bzw. nach unten verschwenkt, wodurch eine entsprechende Arbeitstiefeneinstellung bewirkt werden kann. Die bei Gelenksbewegungen bewirkte Bodenanpassungsbewegung des daran befestigten Querträgers und der wiederum daran befestigten Arbeitseinheit bleibt erhalten.

[0008] Um in der vorgenannten Weise bei Hoch-/Tiefbewegungen des zweiten Viergelenks dem daran gelagerten Querträger eine Schwenkbewegung aufzuprägen, die in der gewünschten Weise verschiedene Abschnitte der daran gelagerten Arbeitseinheit verschieden stark anhebt bzw. absenkt, können grundsätzlich verschiedene Ausbildungen des Viergelenks Verwendung finden. In besonders einfacher Weise kann die gewünschte Kinematik dadurch erreicht werden, dass die beiden maschinenrahmenseitigen Gelenkpunkte des zweiten Viergelenks einen kleineren Abstand voneinander haben als die beiden querträgerseitigen Gelenkpunkte des zweiten Viergelenks. Die entsprechenden Lenker des Viergelenks spreizen sich also sozusagen von dem Maschinenrahmen weg zu dem Querträger hin leicht auf, wodurch bei einer in einer Mittelstellung grob gesprochen liegenden Ausrichtung der beiden Lenker des Viergelenks die gewünschte Kippbewegung des Querträgers und der daran befestigten Arbeitseinheit bewirkt wird. Je nachdem, wie stark sich die Hubbewegung über die Länge der Arbeitseinheit ändern soll, kann das genannte Abstandsverhältnis der maschinenrahmenseitigen Gelenkpunkte einerseits und der querträgerseitigen Gelenkpunkte andererseits verschieden gewählt sein. Nach einer vorteilhaften Ausführung der Erfindung kann der genannte Abstand der beiden maschinenrahmenseitigen Gelenkpunkte des zweiten Viergelenks etwa im Bereich des 0,6- bis 0,95-Fachen des Abstands der beiden querträgerseitigen Gelenkpunkte voneinander liegen, wobei nach einer vorteilhaften Ausführung der Abstand der beiden maschinenrahmenseitigen Gelenkpunkte etwa dem 0,75- bis 0,90-Fachen des Abstands der beiden querträgerseitigen Gelenkpunkte beträgt.

[0009] Um eine weiter verbesserte Variabilität der Bodenanpassung zu erreichen, ist ein Lenker des genannten zweiten Viergelenks, der einen maschinenrahmenseitigen Gelenkpunkt mit einem querträgerseitigen Gelenkpunkt verbindet, längeneinstellbar ausgebildet. Der Lenker kann hierzu teleskopierbar ausgebildet sein oder eine in einer Längsführung verschiebliche Befestigungseinrichtung für einen der Gelenkpunkte besitzen. Nach einer bevorzugten Ausführung der Erfindung kann der Lenker eine längsverstellbare Gewindespindel umfassen. Alternativ kann auch eine druckbetätigte Zylindereinheit vorgesehen sein, die in verschiedenen Stellungen feststellbar ist, beispielsweise durch Sperrung des Hydraulikzu- und -abflusses.

[0010] Das erste Viergelenk, durch welches die Arbeitseinheit selbst an dem verstellbaren Querträger aufgehängt ist, kann grundsätzlich verschieden ausgebildet sein. Nach einer bevorzugten Ausführung der Erfindung bildet das erste Viergelenk zumindest näherungsweise ein Parallelogramm, so dass die Arbeitseinheit gegenüber dem Querträger Auf- und Abbewegungen ausführen kann, ohne eine nennenswerte Rotation zu erfahren.

[0011] In Weiterbildung der Erfindung sind die beiden Viergelenke nicht frei beweglich bzw. ist die an dem ersten Viergelenk aufgehängte Arbeitseinheit nicht nur durch ihr Eigengewicht nach unten hin zum Boden vorgespannt. In Weiterbildung der Erfindung ist dem ersten und/oder dem zweiten Viergelenk eine Bodendruck-Einstell- und/oder -Federeinrichtung zugeordnet, die das jeweilige Viergelenk mit einer bestimmten Kraft, insbesondere Federkraft beaufschlagt, um den Bodenanpressdruck der Arbeitseinheit zu beeinflussen, d.h. zu erhöhen, oder zu minimieren. Um letzteres zu erreichen, wird ein Teil des Eigengewichts der Säeinheit sozusagen abgefan-

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gen, während im umgekehrten Fall das Viergelenk nach unten gedrückt wird, um die Anpresskraft zu erhöhen.

[0012] In vorteilhafter Weiterbildung der Erfindung ist dabei die das erste und/oder zweite Viergelenk beaufschlagende Kraft der Bodendruck-Einstell- und/oder Druckeinrichtung einstellbar, um die notwendige Bodenanpresskraft an die jeweiligen Gegebenheiten, insbesondere die Bodenbeschaffenheit oder die vorzunehmende Arbeit, einstellen zu können.

[0013] Um eine besonders kompakte Anordnung mit wenigen Komponenten zu schaffen, ist nach einer vorteilhaften Ausführung der Erfindung die genannte Bodendruck-Einstelleinrichtung in eine Aushubvorrichtung integriert, mittels derer die Arbeitseinheit vom Boden angehoben werden kann. Die besagte Aushubvorrichtung kann insbesondere eine mehrfach wirksame Stellzylindereinheit aufweisen, die einerseits von einem Aushubdruck und andererseits mit einem Bodenanpressdruck bzw. Bodenentlastungsdruck beaufschlagbar ist.

[0014] Hinsichtlich der Ausbildung der genannten Stellzylindereinheit kann eine vorteilhafte Ausführung darin bestehen, dass zwei Druckzylinder, von denen der eine zum Anheben der Arbeitseinheit in eine Vorgewendestellung und/oder eine Transportstellung vorgesehen und der andere zur Gewichtsentlastung und/oder Erhöhung des Bodenanpressdrucks der Arbeitseinheit in der abgesenkten, über dem Boden geführten Arbeitstellung vorgesehen ist, durch eine gemeinsame Kolbenstange miteinander verbunden sind. Die beiden Hydraulikzylinder teilen sich hierbei sozusagen eine Kolbenstange und sitzen jeweils auf der gemeinsamen Kolbenstange, so dass sie eine hintereinander geschaltete Einheit bilden. Die beiden Druckzylinder sind durch die gemeinsame Kolbenstange miteinander verbunden, die sowohl in den einen als auch in den anderen Druckzylinder einfahren und ausfahren kann. Vorteilhafterweise können durch die Verwendung zweier solcher separater Druckzylinder auf einer gemeinsamen Kolbenstange an sich handelsübliche, vorgefertigte Zylinder Verwendung finden, so dass keine Spezialanfertigungen notwendig sind.

[0015] Vorteilhafterweise greift die dergestalt ausgebildete Bodendruck-Einstellvorrichtung und Aushubeinrichtung an dem zweiten Viergelenk an, so dass der das erste Viergelenk und die Arbeitseinheit tragende Querträger einerseits in eine Vorgewende- bzw. Transportstellung ausgehoben werden kann und andererseits von der zweizylindrig ausgebildeten Stellzylindereinheit auch nur entlastet bzw. nach unten gedrückt werden kann, um den Bodenanpressdruck in der Arbeitsstellung in der gewünschten Höhe sicherzustellen.

[0016] Die Lenker des ersten Viergelenks, das die Arbeitseinheit mit dem Querträger verbindet, sind vorteilhafterweise federbeaufschlagt und/oder federgelagert, so dass sie aus einer Neutralstellung entgegen einer definierten Federkraft auslenkbar sind. In bevorzugter Ausführung der Erfindung können die Lenker des ersten Viergelenks in Gummilagern gelagert sein, die das querträgerseitige Drehgelenk des jeweiligen Lenkers bilden bzw. in dieses integriert sind.

[0017] Die Anordnung der Arbeitseinheit relativ zu dem Maschinenrahmen kann grundsätzlich verschieden getroffen sein. Nach einer bevorzugten Ausführung der Erfindung ist der Querträger dem Fahrwerk des Maschinenrahmens nachlaufend angeordnet, wobei vorzugsweise wiederum die Arbeitseinheit dem genannten Querträger nachlaufend angeordnet ist.

[0018] Bei Ausbildung der Landmaschine als Sämaschine umfasst die Arbeitseinheit vorteilhafterweise zumindest eine Säschar bzw. eine Säscharreihe sowie zumindest eine Tiefenführungs- und/oder Druckrolle, die vorteilhafterweise der besagten zumindest einen Säschar nachlaufend angeordnet ist. Die Tiefenführungs- und/oder Druckrolle kann hierbei nach Art einer Packerwalze in einzelne Walzenabschnitte unterteilt sein, die zueinander koaxial angeordnet sind. In bevorzugter Ausführung der Erfindung können auch in Fahrtrichtung zueinander versetzt mehrere Säscharreihen angeordnet sein, wobei zumindest eine Tiefenführungs- bzw. Druckrolle vorgesehen ist.

[0019] Besonders vorteilhaft ist die beschriebene Aufhängung der Arbeitseinheit an einem Aufsattelgerät verwendbar. Der Maschinenrahmen bildet einen Aufsattelrahmen, der von dem genannten Fahrwerk am Boden abgestützt ist und über die genannten beiden Viergelenke die Arbeitseinheit trägt.

[0020] Die Erfindung wird nachfolgend anhand eines bevorzugten Ausführungsbeispiels und zugehöriger Zeichnungen näher erläutert. In den Zeichnungen zeigen:

[0021] Fig. 1: eine Seitenansicht einer aufgesattelten Sämaschine nach einer bevorzugten Ausführung der Erfindung in einer Arbeitsstellung auf ebenem Boden,

[0022] Fig. 2: eine Seitenansicht der Sämaschine aus Fig. 1, wobei sich die Säeinheit in einer nach oben ausgelenkten Stellung befindet,

[0023] Fig. 3: eine Seitenansicht der Sämaschine aus den vorhergehenden Figuren, wobei die Säeinheit in einer nach unten ausgelenkten Stellung gezeigt ist, und

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[0024] Fig. 4: eine vergrößerte Seitenansicht der Säeinheit und des diese lagernden ersten Viergelenks.

[0025] Die in den Figuren gezeichnete Sämaschine **1** umfasst einen Maschinenrahmen **2**, der über ein Fahrwerk **3**, das in der gezeichneten Ausführung einachsig ausgebildet ist und Räder **4** aufweist, auf dem Boden abgestützt ist. Der Maschinenrahmen **2** ist dabei über eine Deichsel **5** an einen nicht gezeichneten Schlepper anhängbar, und zwar mittels eines Kupplungsstücks **6** am vorderen Ende der Deichsel, das ein Schwenken der Deichsel **5** um eine aufrechte Schwenkachse erlaubt. In der gezeichneten Ausführung umfasst die Deichsel **5** überdies einen vorderen Deichselabschnitt **5a**, der mit einem hinteren Deichselabschnitt **5b** um eine liegende Querachse **7** schwenkbar verbunden ist, so dass die Neigung des Maschinenrahmens **2** unabhängig von der Höhe des schlepperseitigen Kupplungsstücks durch Knicken der Deichsel um die Querachse **7** mittels eines Stellglieds **8** einstellbar ist.

[0026] Am hinteren Ende des Maschinenrahmens **2** ist eine Säeinheit **9** befestigt, die dem Fahrwerk **3** nachlaufend angeordnet ist. Obwohl in den Zeichnungen nicht dargestellt, kann dem Fahrwerk **3** vorlaufend zumindest eine weitere Arbeitseinheit, wie beispielsweise eine Scheibenegge oder dergleichen, vorgesehen und am Maschinenrahmen **2** gelagert sein.

[0027] Die besagte Säeinheit **9** umfasst in der gezeichneten Ausführungsform zwei hintereinander angeordnete Säscharreihen **10** und **11**, denen jeweils nachlaufend Tiefenführungsrollen **12** und **13** zugeordnet sind. Hinter den Tiefenführungsrollen **12** und **13** ist weiterhin eine Bodennachbearbeitungseinrichtung in Form eines Striegels **42** vorgesehen.

[0028] Die Säeinheit **9** ist über ein erstes Viergelenk **14** an einem dem Fahrwerk **3** nachlaufenden Querträger **15** angelenkt, so dass die Säeinheit **9** gegenüber dem Querträger **15** auf und ab bewegbar ist. Wie die Fig. 1 und Fig. 4 zeigen, ist das erste Viergelenk **14** im wesentlichen parallelogrammartig ausgebildet. Es umfasst zwei etwa parallele, liegend angeordnete, in einer unausgelenkten Betriebsstellung leicht nach hinten abfallende Lenker **16** und **17**, die einerseits an jeweils einem querträgerseitigen Gelenkpunkt **18** bzw. **19** (vgl. Fig. 4) um liegende Querachsen schwenkbar an dem Querträger **15** angelenkt sind und andererseits an säscharträgerseitigen Gelenkpunkten **20** bzw. **21** um liegende Querachsen schwenkbar mit einem Säscharträger **22** verbunden sind, an dem die Säschare, die Tiefenführungsrollen und die Striegeleinrichtung befestigt sind.

[0029] Wie Fig. 4 zeigt, sind die Gelenkpunkte **19** und **21** des unteren Lenkers **17** als Gummigelenklager ausgebildet, die aus einer Ausgangslage in beide Richtungen rotatorisch auslenkbar sind und dabei elastische Rückstellkräfte zur Ausgangslage hin zurück erzeugen. Die genannten Gummilager bilden insofern eine Federeinrichtung, die das erste Viergelenk **14** beaufschlagt und in eine Ausgangslage rückzustellen versucht, wenn es ausgelenkt wurde. Zudem bilden die genannten Gummilager natürlich auch eine Dämpfungseinrichtung, die auf die Säschare bzw. die Tiefenführungsrollen eingeleitete Stöße zu dämpfen vermag.

[0030] Der Querträger **15**, an dem das genannte erste Viergelenk **14** angeschlagen ist, ist, wie Fig. 1 zeigt, durch ein zweites Viergelenk **23** an dem Maschinenrahmen **2** angelenkt. Dieses zweite Viergelenk **23** besitzt eine von einem Parallelogramm abweichende Geometrie. In der gezeichneten Ausführung sind die beiden Lenker **24** und **25** des zweiten Viergelenks **23** in einer zur Säeinheit **9** hin leicht auseinander laufenden Anordnung vorgesehen. Die beiden maschinenrahmenseitigen Gelenkpunkte **26** und **27**, an denen jeweils einer der Lenker **24** und **25** angelenkt ist, besitzen einen etwas geringeren Abstand voneinander als die beiden querträgerseitigen Gelenkpunkte **28** und **29**, die an einem mit dem Querträger **15** drehfest verbundenen Querträgerarm **30** vorgesehen sind. Dabei besitzen die beiden Lenker **24** und **25** eine miteinander vergleichbare, d.h. etwa gleich große Länge, wobei jedoch einer der beiden Lenker – in der gezeichneten Ausführung der obere Lenker **24** – längenveränderbar ausgebildet ist, um eine Einstellbarkeit der Geometrie des zweiten Viergelenks zu ermöglichen. Die beiden Lenker **24** und **25** sind – grob gesprochen – etwa liegend angeordnet, wobei sie in der unausgelenkten Arbeitsstellung leicht nach hinten abfallen, wobei wiederum der untere Lenker **25** stärker abfallend angeordnet ist.

[0031] Um eine Arbeitstiefeneinstellung ohne Geometrieveränderung am Viergelenk **23** vornehmen zu können, ist der obere maschinenrahmenseitige Gelenkpunkt **26** verstellbar ausgebildet. Wie Fig. 1 zeigt, ist der obere maschinenrahmenseitige Gelenkpunkt **26** an einem Schwenkarm **31** vorgesehen, der an dem Maschinenrahmen **2** um eine Querachse schwenkbar angelenkt ist, die mit dem unteren maschinenrahmenseitigen Gelenkpunkt **27** fluchtet. Demzufolge kann der obere maschinenrahmenseitige Gelenkpunkt **26** auf einer Kreisbahn um den unteren maschinenrahmenseitigen Gelenkpunkt **27** verschwenkt werden. Hierzu ist ein Stellglied **32** vorgesehen, das an dem Schwenkarm **31** und andererseits an dem Maschinenrahmen **2** gelenkig befestigt ist und in der gezeichneten Ausführung aus einer längenveränderbaren Schraubspindel besteht. Wird das genannte Stellglied **32** verkürzt, wird das zweite Viergelenk **23** bei ansonsten unveränderter Geometrie derart verschwenkt, dass der Querträger **15** leicht angehoben wird. Umgekehrt kann durch Verlängerung

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des Stellglieds **32** der Querträger **15** abgesenkt werden.

[0032] Zum Ausheben der Säeinheit **19** ist eine Aushubvorrichtung **33** vorgesehen, die einen Druckzylinder **34** umfasst, der einerseits am Maschinenrahmen **2** und andererseits an einem der Lenker **25** des zweiten Viergelenks **23** angreift, um das Viergelenk nach oben zu schwenken und damit die Säeinheit **9** vom Boden auszuheben.

[0033] In die Aushubvorrichtung **33** ist weiterhin eine Bodendruckeinstellvorrichtung **35** integriert, die einen Druckzylinder **37** umfasst, der vorteilhafterweise auf derselben Kolbenstange **36** sitzt, auf der auch der Druckzylinder **34** der Aushubvorrichtung **33** sitzt. Die beiden Druckzylinder **34** und **37** sitzen dabei auf gegenüberliegenden Enden der gemeinsamen Kolbenstange **36** und können jeweils als einfach wirkende Zylinder ausgebildet sein.

[0034] Der den Bodenanpressdruck steuernde Druckzylinder **37** ist vorteilhafterweise, wie Fig. 1 zeigt, mit einem Druckspeicher **38** verbindbar, der den Druckzylinder **37** mit einem entsprechenden Druck beaufschlagt, um die Bodenanpressung der Säeinheit **9** im gewünschten Maß zu erreichen. Vorteilhafterweise ist dabei der in dem Druckspeicher **38** bzw. dem damit verbundenen Druckkreis herrschende Druck einstellbar. Dies kann beispielsweise durch eine über ein Ventil **39** anschließbare Pumpe **40** erreicht werden.

[0035] Damit ergibt sich folgende Funktion: In der in Fig. 1 gezeigten Betriebsstellung auf ebenem Boden kann durch Längenveränderung des Stellglieds **32** und/oder durch Längenveränderung des oberen Lenkers **24** des zweiten Viergelenks **23** die Sätiefe der Säeinheit **9** eingestellt werden. Durch Einstellung des Vorspanndrucks im Druckzylinder **38** kann der Bodenanpressdruck variiert werden.

[0036] Wie Fig. 2 zeigt, kann die Säeinheit **9** bei Einfahren in eine Bodenmulde gegenüber dem Maschinenrahmen **2** nach oben schwenken, um der abfallenden Kontur der Bodenmulde zu folgen. Vorteilhafterweise wird hierbei dann, wenn das zweite Viergelenk **23** nach oben schwenkt, was insbesondere bei Überfahren größerer Unebenheiten erfolgt, der von den Tiefenführungsrollen **12** und **13** gebildete, weiter hinten liegende Teil der Säeinheit **9** stärker angehoben als der von den Säscharen **10** und **11** gebildete weiter vorne liegende Teil der Säeinheit **9**.

[0037] Umgekehrt kann die Säeinheit **9** bei Auffahren auf eine Bodenerhebung gegenüber dem Maschinenrahmen **2** absinken. Hierbei wird der genannte hintere Teil der Säeinheit **9** stärker abgesenkt als der vordere Teil der Säeinheit **9**, wodurch eine insgesamt verbesserte Bodenanpassung erreicht wird.

[0038] Vorteilhaft ist hierbei die Kombination des im wesentlichen parallelogrammartig ausgebildeten ersten Viergelenks **14** mit dem von der Parallelogrammform abweichenden zweiten Viergelenk **23**. Kleinere Bodenanpassungen können durch Verschwenken des ersten Viergelenks **14** erfolgen, wobei hier ein gleichmäßiges Anheben und Absenken der Säeinheit **9** erfolgt. Werden hingegen größere Bodenunebenheiten überfahren, kommt die Anpassbewegung durch das zweite Viergelenk **23** hinzu, die in der genannten Weise ein verstärktes Anheben bzw. Absenken des hinteren Säeinheitsabschnitts vorsieht.

Patentansprüche

1. Landmaschine, insbesondere aufgesattelte Sämaschine, mit einem Maschinenrahmen (**2**), der über ein Fahrwerk (**3**) auf dem Boden abgestützt ist, sowie zumindest einer Arbeitseinheit (**9**), insbesondere Säeinheit umfassend Säschar (**10**, **11**) und Tiefenführungs- und/oder Druckrolle (**12**, **13**), die an dem Maschinenrahmen (**2**) höhenveränderbar gelagert ist, wobei die Arbeitseinheit (**9**) über ein erstes Viergelenk (**14**) an einem Querträger (**15**) höhenveränderlich gelagert ist, der wiederum über ein zweites Viergelenk (**23**) an dem Maschinenrahmen (**2**) höhenveränderlich gelagert ist, **dadurch gekennzeichnet**, dass das zweite Viergelenk (**23**) derart ausgebildet ist, dass bei Hubbewegungen des zweiten Viergelenks (**23**) der Querträger (**15**) eine Drehbewegung erfährt, die in Arbeitsstellung einem von dem Fahrwerk (**3**) weiter beabstandeten Abschnitt der Arbeitseinheit (**9**) eine größere Hubbewegung gibt als einem von dem Fahrwerk (**3**) weniger weit beabstandeten Abschnitt der Arbeitseinheit (**9**).

2. Landmaschine nach dem vorhergehenden Anspruch, wobei das zweite Viergelenk (**23**) eine von der Parallelogrammform abweichende Geometrie besitzt.

3. Landmaschine nach einem der vorhergehenden Ansprüche, wobei die beiden maschinenrahmenseitigen Gelenkpunkte (**26**, **27**) des zweiten Viergelenks (**23**) einen kleineren Abstand voneinander haben als die beiden querträgerseitigen Gelenkpunkte (**28**, **29**) des zweiten Viergelenks (**23**).

4. Landmaschine nach dem vorhergehenden Anspruch, wobei der Abstand der beiden maschinenrahmenseitigen Gelenkpunkte (**26**, **27**) etwa dem 0,6- bis 0,95-Fachen, vorzugsweise etwa dem 0,75- bis 0,90-Fachen des Abstands der beiden querträgerseitigen Gelenkpunkte (**28**, **29**) entspricht.

5. Landmaschine nach einem der vorhergehenden Ansprüche, wobei zumindest einer der beiden maschinenrahmenseitigen Gelenkpunkte (**26**, **27**) des zweiten Viergelenks (**23**) verstellbar ausgebildet ist und/oder durch ein Stellglied (**32**) in verschiedene

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Positionen bringbar und festlegbar ist.

6. Landmaschine nach dem vorhergehenden Anspruch, wobei der verstellbare Gelenkpunkt (**26**) von einer Gelenkpunktführung, insbesondere einem um den anderen maschinenrahmenseitigen Gelenkpunkt (**27**) des zweiten Viergelenks (**23**) drehbaren Schwenkarm (**31**), auf einem Kreisbogen um den anderen maschinenrahmenseitigen Gelenkpunkt (**27**) des zweiten Viergelenks (**23**) geführt ist.

7. Landmaschine nach einem der vorhergehenden Ansprüche, wobei mindestens ein Lenker (**24**) des zweiten Viergelenks (**23**), der einen maschinenrahmenseitigen Gelenkpunkt (**26**) mit einem querträgerseitigen Gelenkpunkt (**28**) des zweiten Viergelenks (**23**) verbindet, längeneinstellbar ausgebildet ist.

8. Landmaschine nach einem der vorhergehenden Ansprüche, wobei das erste Viergelenk (**14**) zumindest näherungsweise ein Parallelogramm bildet.

9. Landmaschine nach einem der vorhergehenden Ansprüche, wobei das erste und/oder das zweite Viergelenk (**14**; **23**) von einer Bodendruckfeder- und/oder -einstelleinrichtung (**35**) beaufschlagbar ist, deren Federkraft und/oder -härte einstellbar ausgebildet ist.

10. Landmaschine nach dem vorhergehenden Anspruch, wobei die Bodendruckfeder- und/oder -einstelleinrichtung (**35**) in eine Aushubvorrichtung (**33**) zum Ausheben der Arbeitseinheit (**9**) integriert ist.

11. Landmaschine nach dem vorhergehenden Anspruch, wobei die Aushubvorrichtung (**33**) und die Bodendruckfeder- und/oder -einstelleinrichtung (**35**) eine gemeinsame mehrfach wirksame Stellzylindereinheit aufweisen, die einerseits von einem Aushubdruck und andererseits von einem Bodenanpressdruck beaufschlagbar ist.

12. Landmaschine nach dem vorhergehenden Anspruch, wobei die Stellzylindereinheit einen ersten Druckzylinder (**34**) zum Ausheben der Arbeitseinheit (**9**) und einen zweiten Druckzylinder (**37**) zur Beeinflussung des Bodenanpressdrucks der Arbeitseinheit (**9**) aufweist, die durch eine gemeinsame Kolbenstange (**36**) miteinander verbunden sind.

13. Landmaschine nach dem vorhergehenden Anspruch, wobei der Druckzylinder (**37**) zur Beeinflussung des Bodenanpressdrucks über einen Druckkreis (**41**) mit einem Druckspeicher (**38**) verbindbar ist, der einen Befüll/Entlastungsanschluss (**39**) aufweist, der von einem Absperrventil absperrbar ist und Anschlussmittel zum Anschließen an eine schlepperseitige Hydraulikdruckversorgung aufweist.

14. Landmaschine nach Anspruch 12, wobei der Druckzylinder (**37**) zur Beeinflussung des Bodenanpressdrucks an eine steuerbare Druckversorgung anschließbar ist, eine Sensoreinrichtung zur Erfassung eines Ist-Werts des Bodenauflagedrucks der Arbeitseinheit (**9**) vorgesehen ist und von einer elektronischen Steuereinrichtung die Druckversorgung in Abhängigkeit eines Signals der Sensoreinrichtung ansteuerbar ist.

Es folgen 4 Blatt Zeichnungen

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Anhängende Zeichnungen

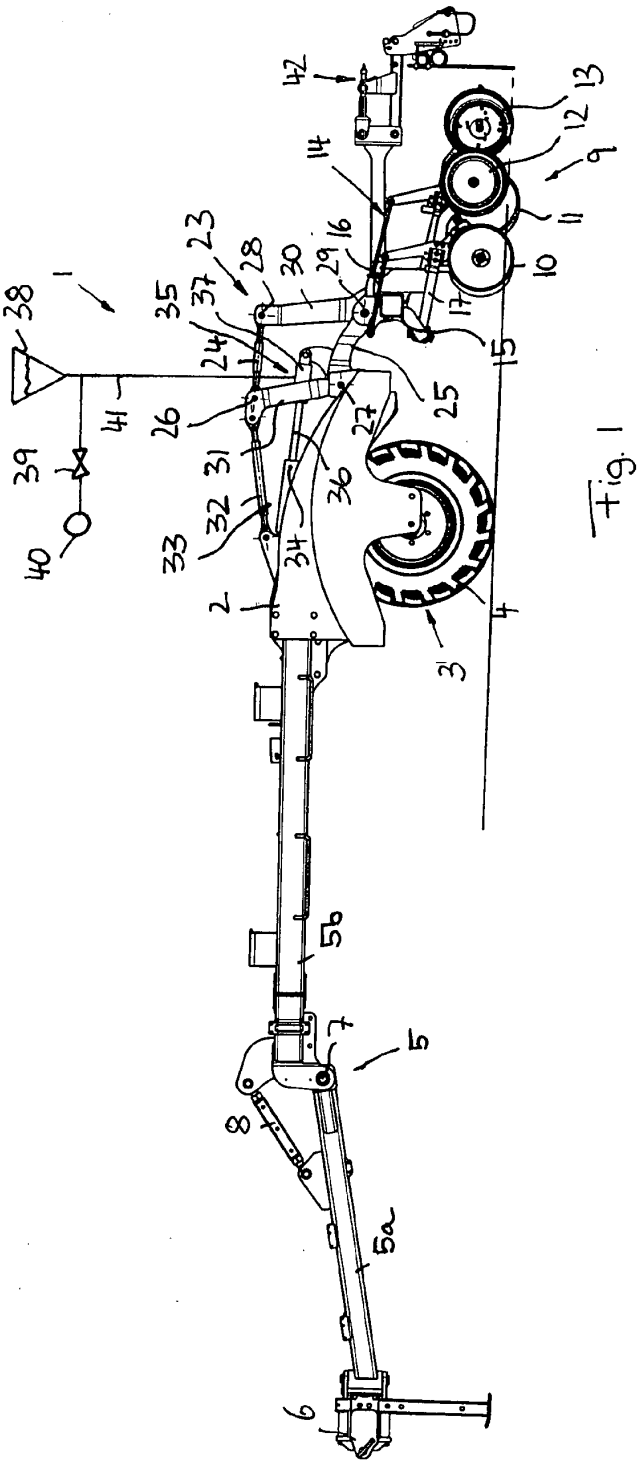


Fig. 1

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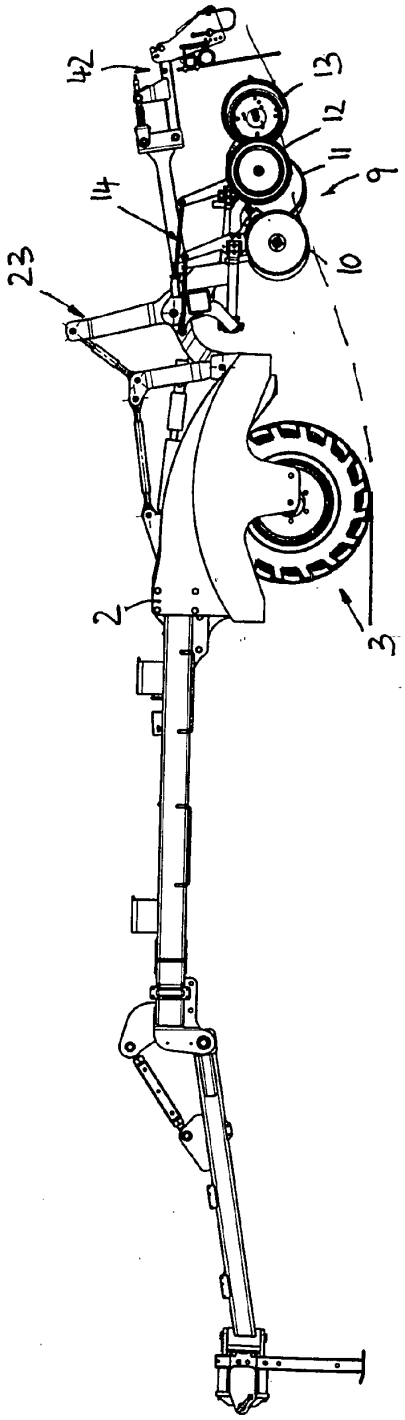


Fig. 2

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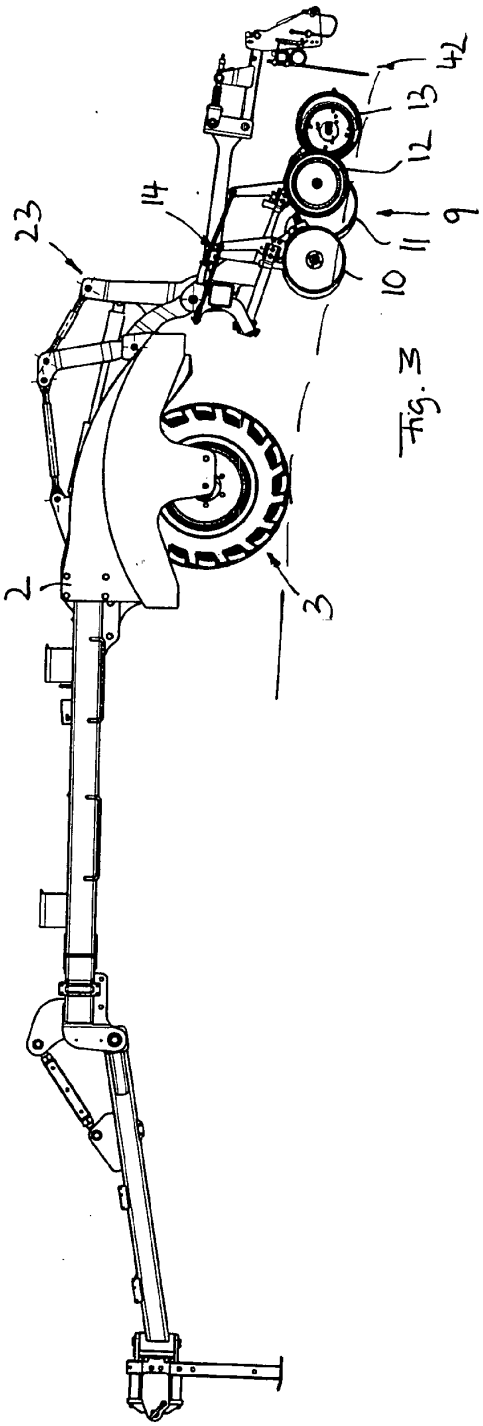


Fig. 3

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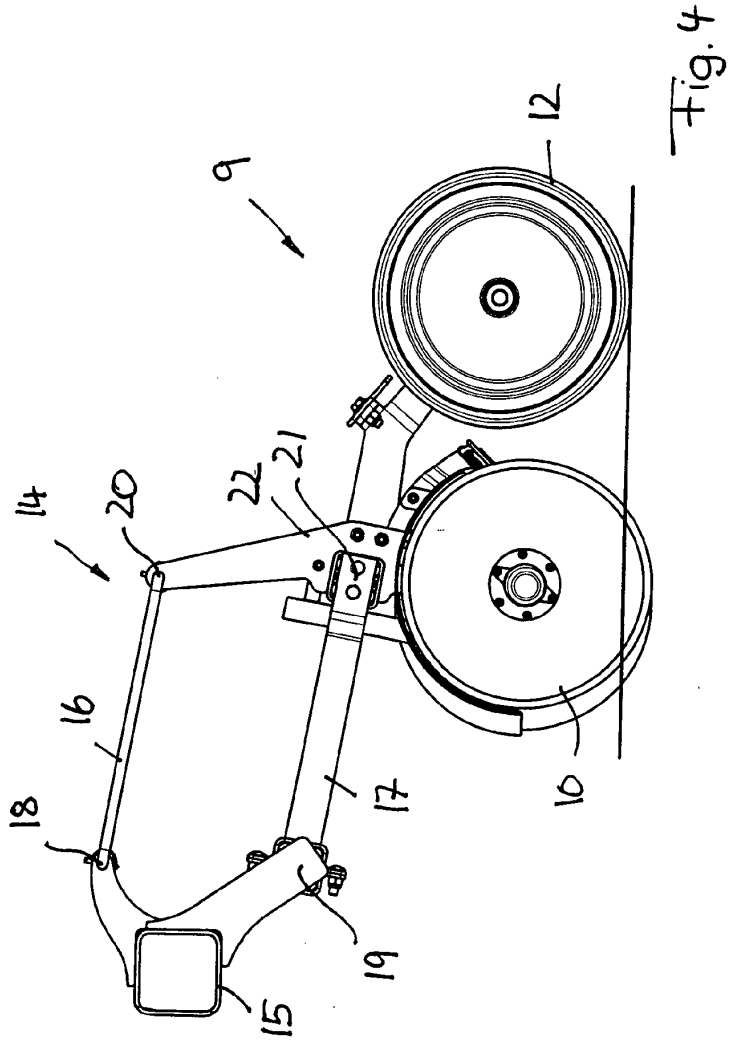


Fig. 4

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Agricultural machine

Images (3)



Classifications

A01B63/28 Tools or tool-holders adjustable relatively to the frame operated by the machine or implement

View 3 more classifications

EP2335465B1
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Other languages: German, French

Inventor: Michael Pokriefke

Current Assignee : Amazonen Werke H Dreyer SE and Co KG

Worldwide applications

2009 DE 2010 EP PL

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2012-05-23 Publication of EP2335465B1

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Info: Patent citations (3), Cited by (7), Legal events, Similar documents, Priority and Related Applications

External links: Espacenet, EPO GPI, EP Register, Global Dossier, Discuss

Claims (2) Hide Dependent

1. Agricultural machine, in particular a semi-mounted seed drill, having a machine frame supported on the ground by a running gear and at least one work unit disposed on a supporting frame, comprising soil cultivating elements having associated depth control rollers and/or pressure rollers, wherein the soil cultivating elements having the associated depth control rollers and/or pressure rollers are arranged so as to be movable in the vertical direction and are pressed against the ground by means of spring elements, wherein the supporting frame is arranged on the machine frame by means of an articulated coupling such that it can be pivoted by means of a motor-driven actuating device about a pivot axle running transversely to the direction of travel, wherein the soil cultivating elements are arranged one behind the other, at a distance apart, in at least two cross-rows, **characterized in that** a sensor element (20) for registering the deflection of the soil cultivating element (8) in relation to the supporting frame (6) is respectively assigned to at least one soil cultivating element (8) of the front cross-row and of the rear cross-row, **in that** the agricultural machine is connected to an on-board computer (21), **in that** the sensor elements (20) transmit signals to the on-board computer (21), **in that** the motor-driven actuating device (18) can be controlled by the on-board computer (21), on the basis of an evaluation program stored in the memory of the on-board computer (21), in such a way that, through pivoting of the supporting frame (6) by the actuating device (18), the deflection of the soil cultivating elements (8) of the first cross-row can be set and/or kept at least approximately equal to the deflection of the soil cultivating elements (8) of the rear cross-row in relation to the supporting frame (6) throughout the cultivating operation.

2. Agricultural machine according to Claim 1, **characterized in that** the work unit (7) comprises a sowing unit having at least one seed coulter (8) with depth control roller and/or pressure roller (9).

Description translated from German

The invention relates to an agricultural machine according to the preamble of claim 1.

Such an agricultural machine is for example by the DE 10 2006 034 798 A1 known. This agricultural machine is designed as a seeder. Here, the machine frame can be adjusted by a transverse to the direction of travel pivot axis by means of a motorized adjusting device to achieve an adaptation of the coulters to the bottom contour, so as far as possible a uniform working depth or placement depth of auszubringenden seeds is ensured. The arrangement and configuration of the machine frame for the adaptation of trained as coulters soil cultivation elements is relatively expensive

The invention has for its object to be able to achieve a uniform processing depth of tillage tools and / or placement depth of the seed to be deposited by tillage agents and / or coulters in a simple manner.

This object is achieved by the characterizing features of claim 1. As a result of these measures, the position of the tillage elements is queried to the machine frame in a simple manner and adjusted the machine frame so far that the tillage elements in the first transverse row are in the same position to the machine frame as the soil cultivation elements of the rear transverse row. Thus, therefore, in a surprisingly simple manner only by the adjustment of the machine frame, on which the soil cultivation elements are arranged in uneven and changing ground surfaces to achieve a uniform processing depth.

Thus, a bottom-parallel alignment of the support frame is made possible by the scanning of the ground parallelism by means of the determination of the angular position or position of the soil cultivation elements in a simple manner. Thus, the working depth when crossing valleys and mountain tops can be achieved in a simple manner in a simple manner. So there is a simple adjustment of the angular position between the soil cultivation element of the front and rear transverse row.

In order to use the agricultural machine in a simple manner as a seeder, it is provided that the saw unit formed as a working unit comprises at least one coulter with Tiefenführungs- and / or pressure roller.

Fig. 1
: die Landmaschine in Seitenansicht und Prinzipdarstellung beim Überqueren einer Bergkuppe ohne Nachstellung des Maschinenrahmens gegenüber dem Tragrahmen,

Fig. 2
: den an dem Tragrahmen angeordneten Maschinenrahmen mit Säscharen und Tiefenführungsrollen gemäß Fig. 1 in vergrößertem Maßstab,

Fig. 3
: die Landmaschine in Seitenansicht und Prinzipdarstellung beim Überqueren einer Bergkuppe mit Nachstellung des Maschinenrahmens gegenüber dem Tragrahmen,

Fig. 4
: den an dem Tragrahmen angeordneten Maschinenrahmen mit Säscharen und Tiefenführungsrollen gemäß Fig. 3 in vergrößertem Maßstab,

Fig. 5
: die Landmaschine in Seitenansicht und Prinzipdarstellung beim Überqueren einer Senke mit Nachstellung des Maschinenrahmens gegenüber dem Tragrahmen und

Fig. 6
: den an dem Tragrahmen angeordneten Maschinenrahmen mit Säscharen und Tiefenführungsrollen gemäß Fig. 5 in vergrößertem Maßstab.

Further details of the invention can be taken from the example description and the drawings. Show here

Fig. 1
: the agricultural machine in side view and schematic representation when crossing a hilltop without adjustment of the machine frame relative to the support frame,

Fig. 2
: arranged on the support frame machine frame with coulters and depth control rollers according to Fig. 1 on an enlarged scale,

Fig. 3
: the agricultural machine in side view and schematic representation when crossing a hilltop with adjustment of the machine frame with respect to the support frame,

Fig. 4
: arranged on the support frame machine frame with coulters and depth control rollers according to Fig. 3 on an enlarged scale,

Fig. 5
: the agricultural machine in side view and schematic representation when crossing a sink with adjustment of the machine frame relative to the support frame and

Fig. 6
: arranged on the support frame machine frame with coulters and depth control rollers according to Fig. 5 on an enlarged scale.

The agricultural machine is designed as a semi-mounted seeder. The drill has a machine frame 1, which is supported by a chassis 2 on the ground. The machine frame 1 has on its front side a pulling device 3, which is coupled to the hitching devices 4 of the tractor 5 pulling the agricultural machine.

On the back of the machine frame 1, a support frame 6 is arranged. At this support frame 6, a work unit 7 is arranged. The working unit 7 comprises tilling units 8 formed tillage elements with associated Tiefenführung- and / or pressure rollers 9. The seed coulters 8 formed tillage elements are arranged in the embodiment in three transverse rows at a distance from each other in succession. The soil working elements 8 with the associated depth guide rollers 9 are each movable by means of a holding arm 10 with a hinge connection 11 in the height direction at the spaced from each other arranged crossbar 12 of the support frame 6 is arranged. The soil working elements 8 are pressed against the ground 13 by spring elements, not shown, arranged between the holding arms 10 of the soil cultivation elements 8 and the transverse bars 12. These spring elements may be formed, for example, as known rubber bearings. Here, the spring force is applied by rotating the rotatable on the support frame 6 arranged crossbar 12 by means of the hydraulic cylinder 14 designed as actuating means by the rubber elements.

The support frame 6 is attached by means of a hinge assembly 15 to the machine frame 1. This hinge assembly 15 has a transverse to the direction of travel 16 pivot axis 17. Furthermore, at least one hydraulic actuator 18 formed as a motorized actuating device is disposed between the support frame 6 and the machine frame 1. By means of this hydraulic cylinder 18, the support frame 6 with the soil working elements 8 and associated rollers 9 arranged thereon can be pivoted about the pivot axis 18 extending transversely to the direction of travel 16.

As the Fig. 1 and 2 show when driving over a bottom dome 19 is no longer ensured that all coulters 8 penetrate into the soil 13 or evenly penetrate deep into the soil 13 to edit the soil 13 and to deposit the auszubringende seed, like the Fig. 1 and 2 demonstrate. In the illustrated situation, the machine frame 1 or the line drawn by the support beam 12 is no longer parallel to the ground surface to be processed 13. Due to the spring arrangement, the coulters 8 are indeed pressed down, but since the support frame is not parallel to the soil surface, he can not adapt to the shape of the soil surface 13.

To remedy this situation, the support frame 6 by means of the hydraulic cylinder 18 must be pivoted about the pivot axis 17 passing through the hinge assembly 15, as the 3 and 4 demonstrate. After pivoting, the support frame 6 is parallel to the ground surface to be processed 13, so that all coulters 8 penetrate deep into the bottom 13 and the rollers 9 are pressed by the spring force against the bottom 13.

In order to achieve this automatically, in each case one soil cultivation element 8 of the front transverse row and the rear transverse row is assigned a sensor element 20 for detecting the deflection of the holding arm 10 of the soil cultivation element 8 relative to the support frame 6. This sensor 20 sends signals and data to a vehicle on the tractor 5 arranged on-board computer 21. In the memory of the on-board computer 21 an evaluation program is deposited, by means of which the controls of the motorized control device 18 are controlled by the on-board computer 21, by pivoting the support frame 6 by the adjusting device 18 is the deflection of the tillage elements 8 of the first transverse row at least approximately equal to the deflection of the tillage elements 8 of the rear transverse row relative to the support frame 6, as the 3 and 4 demonstrate. By means of this evaluation program of the on-board computer 21 and the detection of the position of the support arms 10 of the tillage elements 8 relative to the support frame 6, the position of the support frame 6 to the soil cultivation elements 8 and thus to the contour of the soil surface 13 is adjustable during the entire processing operation and the deflection of the soil cultivation elements 8 of rear Transverse row relative to the support frame 6 and the

deflection of the soil working elements 8 with respect to the first transverse row at least approximately equal to set and hold. Thus, a uniform penetration depth of the soil cultivation elements 8 or the coulters into the soil 13 is achieved. By a simple adjustment of the angle values between the soil cultivation elements 8 of the first transverse row and the soil cultivation elements 8 of the rear transverse row relative to the support frame 6, an adjustment to the ground level or course can be achieved in a simple manner via the setting of the support frame 6.

In the Fig. 4 and 5 the situation is shown when the agricultural machine passes through a sink 22. Again, there is a pivoting of the support frame 6 via the hydraulic cylinder 18 due to the signals evaluated on the on-board computer 21, so that here the support frame 6 opposes the setting according to 3 and 4 is pivoted.

Patent Citations (3)

Publication number	Priority date	Publication date	Assignee	Title
Family To Family Citations				
DE3430136C1 *	1984-08-16	1986-04-24	Amazonen-Werke H. Dreyer Gmbh & Co Kg, 4507 Hasbergen	Seed drill
DE102006034798B4	2006-07-27	2014-02-13	Alois Pöttinger Maschinenfabrik Gmbh	agricultural machinery
CA2594032C *	2007-07-18	2015-01-27	Bourgault Industries Ltd.	Method and device for adjusting and controlling packing force

* Cited by examiner, † Cited by third party

Cited By (7)

Publication number	Priority date	Publication date	Assignee	Title
Family To Family Citations				
FR2967865B1 *	2010-11-30	2012-12-07	Agrotronix	AGRICULTURAL MACHINE WITH AUTOMATIC PLATE CORRECTION
FR3012721B1 *	2013-11-05	2016-12-30	Alois Pottinger Maschf Gmbh	SOIL WORKING MACHINE
CH711399B1 *	2015-08-03	2019-09-13	Krummenacher Saattechnik Ag	Agricultural machine for working a soil and for spreading seed.
BR112019010534A2 *	2016-12-16	2019-09-17	Agco Corp	machinery bypassing toolbar
DE102017103646A1	2017-02-22	2018-08-23	Horsch Maschinen Gmbh	Agricultural machine and process for an agricultural machine
DE102017223790A1 *	2017-12-23	2019-06-27	Horsch Maschinen Gmbh	Control system for working tools of agricultural machinery, agricultural machine for soil preparation and / or sowing and method for controlling the bearing pressure and / or the working depth of agricultural tools
DE102019134184A1	2019-11-08	2021-05-12	Horsch Maschinen Gmbh	Agricultural machine, preferably for soil cultivation and / or sowing and a method for controlling and / or regulating the working depth of a tool unit

* Cited by examiner, † Cited by third party, ‡ Family to family citation

Similar Documents

Publication	Publication Date	Title
EP2335465B1	2012-05-23	Agricultural machine
DE2140410B2	1977-12-22	SAEMASCHINE THAT CAN BE CONNECTED TO A PULLING VEHICLE
DE19942260A1	2001-03-08	Agricultural implement for spreading crops
DE102019004563B4	2019-10-02	agricultural machinery
EP3152990B1	2018-03-21	Soil cultivation device
EP3360403B1	2020-04-01	Sowing unit for a sowing machine
DE102015111779A1	2017-01-26	seeder
EP1974596B1	2013-08-07	Seed coulter assembly
EP0427154B1	1994-07-20	Soil-tilling implement

EP3020261B1	2018-07-18	Combination of an agricultural towing vehicle and a minimum till seeder
DE102004008089A1	2005-09-08	Mulch seeder has depth adjusting wheel mounted on parallelogram lever system and attached to connecting rods linking it to seeding disks so that angle between ground surface and disk mounting remains constant for depths up to 6 cm
EP3515167B1	2021-07-07	Sowing machine for dispensing seeds and/or fertiliser
EP2793542A2	2014-10-29	Integrated soil-tilling apparatus for rotary ploughs
DE102008059144A1	2010-05-27	Straw comb for being attached to three-point hitch of tractor for cultivation of soil, has shaft disks arranged parallel to each other and freely rotatable around axis that runs transverse to driving direction
EP3127412A1	2017-02-08	Agricultural machine for processing soil and for depositing seeds
DE102012008305A1	2013-08-22	Device for the strip-wise agricultural processing of soils
DE202019109926U1	2020-05-20	Device for an agricultural machine
EP1700518A1	2006-09-13	Seeder with a frame
EP1579751A1	2005-09-28	Seeder
EP1825733A1	2007-08-29	Soil cultivation device
EP0983715A2	2000-03-08	Straw comb
DE376508C	1923-05-29	Sowing machine for flat cultivation
DE102005038096A1	2007-02-15	seeder
DE730754C	1943-01-18	Row sowing machine adjustable for sowing in rows with wide spacing
DE102004026880A1	2005-12-22	disk device

Priority And Related Applications

Priority Applications (1)

Application	Priority date	Filing date	Title
DE102009044898A	2009-12-15	2009-12-15	agricultural machinery

Applications Claiming Priority (1)

Application	Filing date	Title
PL104012117	2010-12-03	Agricultural machine

Legal Events

Date	Code	Title	Description
2011-05-20	PUAI	Public reference made under article 153(3) epc to a published international application that has entered the european phase	**Free format text:** ORIGINAL CODE: 0009012
2011-06-22	AK	Designated contracting states	**Kind code of ref document:** A1 **Designated state(s):** AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT N NO PL PT RO RS SE SI SK SM TR
2011-06-22	AX	Request for extension of the european patent	**Extension state:** BA ME
2012-01-11	17P	Request for examination filed	**Effective date:** 20111124
2012-01-20	REG	Reference to a national code	**Ref country code:** DE **Ref legal event code:** R079 **Ref document number:** 502010000798

			Country of ref document: E **Free format text:** PREVIOU MAIN CLASS: A01B0063114000 **ipc:** A01B0063280000
2012-01-31	GRAP	Despatch of communication of intention to grant a patent	**Free format text:** ORIGINAL CODE: EPIDOSNIGR1
2012-02-29	RIC1	Information provided on ipc code assigned before grant	**ipc:** A01C 5/06 20060101ALI20120120BH **ipc:** A01B 63/28 20060101AFI20120120BH **ipc:** A01B 63/00 20060101ALI20120120BH
2012-04-05	GRAS	Grant fee paid	**Free format text:** ORIGINAL CODE: EPIDOSNIGR3
2012-04-21	GRAA	(expected) grant	**Free format text:** ORIGINAL CODE: 0009210
2012-04-21	STAA	Information on the status of an ep patent application or granted ep patent	**Free format text:** STATUS: THE PATENT HAS BEEN GRANTED
2012-05-23	AK	Designated contracting states	**Kind code of ref document** B1 **Designated state(s):** AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT N NO PL PT RO RS SE SI SK SM TR
2012-05-23	REG	Reference to a national code	**Ref country code:** GB **Ref legal event code:** FG4D **Free format text:** NOT ENGLISH
2012-05-31	REG	Reference to a national code	**Ref country code:** CH **Ref legal event code:** EP
2012-06-12	REG	Reference to a national code	**Ref country code:** SE **Ref legal event code:** TRGR
2012-06-15	REG	Reference to a national code	**Ref country code:** AT **Ref legal event code:** REF **Ref document number:** 558601 **Country of ref document:** A **Kind code of ref document** **Effective date:** 20120615
2012-06-29	REG	Reference to a national code	**Ref country code:** IE **Ref legal event code:** FG4D **Free format text:** LANGUAG OF EP DOCUMENT: GERMA
2012-07-19	REG	Reference to a national code	**Ref country code:** DE **Ref legal event code:** R096 **Ref document number:** 502010000796 **Country of ref document:** D **Effective date:** 20120719

2012-08-31	REG	Reference to a national code	**Ref country code:** PL **Ref legal event code:** T3
2012-09-12	REG	Reference to a national code	**Ref country code:** NL **Ref legal event code:** VDEP **Effective date:** 20120523
2012-10-25	REG	Reference to a national code	**Ref country code:** LT **Ref legal event code:** MG4 **Effective date:** 20120509
2012-10-31	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** LT **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION OF THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120523 **Ref country code:** FI **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION OF THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120523 **Ref country code:** NO **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION OF THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120823 **Ref country code:** CY **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION OF THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120523 **Ref country code:** IS **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION OF THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120923 **Ref country code:** RS **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION OF THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120523
2012-11-30	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** LV **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION OF THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120523 **Ref country code:** GR

			Free format text: LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120824 **Ref country code:** SI **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120523 **Ref country code:** PT **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120924 **Ref country code:** HR **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120523
2013-01-31	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** DK **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120523 **Ref country code:** EE **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120523 **Ref country code:** SK **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120523 **Ref country code:** CZ **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120523 **Ref country code:** NL **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120523 **Ref country code:** RO

			Free format text: LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120523
2013-03-29	PLBE	No opposition filed within time limit	**Free format text:** ORIGINAL CODE: 0009261
2013-03-29	STAA	Information on the status of an ep patent application or granted ep patent	**Free format text:** STATUS: NO OPPOSITION FILED WITHIN TIME LIMIT
2013-04-30	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** ES **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120903
2013-05-01	26N	No opposition filed	**Effective date:** 20130226
2013-06-27	REG	Reference to a national code	**Ref country code:** DE **Ref legal event code:** R097 **Ref document number:** 502010000798 **Country of ref document:** D **Effective date:** 20130226
2013-06-30	BERE	Be: lapsed	**Owner name:** AMAZONEN-WERKE H. DREYER G.M.B.H & CO. KG **Effective date:** 20121231
2013-07-31	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** MC **Free format text:** LAPSE BECAUSE OF NON-PAYMEI OF DUE FEES **Effective date:** 20121231 **Ref country code:** BG **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120823
2013-09-25	REG	Reference to a national code	**Ref country code:** IE **Ref legal event code:** MM4
2013-09-30	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** BE **Free format text:** LAPSE BECAUSE OF NON-PAYMEI OF DUE FEES **Effective date:** 20121231
2013-10-31	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** IE **Free format text:** LAPSE BECAUSE OF NON-PAYMEI OF DUE FEES **Effective date:** 20121203
2013-11-29	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** AL

			Free format text: LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120523 **Ref country code:** MT **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120523
2014-04-30	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** TR **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120523
2014-05-30	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** SM **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120523 **Ref country code:** LU **Free format text:** LAPSE BECAUSE OF NON-PAYME OF DUE FEES **Effective date:** 20121203
2014-07-31	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** HU **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20101203
2015-07-31	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** MK **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20120523
2015-07-31	REG	Reference to a national code	**Ref country code:** CH **Ref legal event code:** PL
2015-08-26	GBPC	Gb: european patent ceased through non-payment of renewal fee	**Effective date:** 20141203
2015-10-30	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** CH **Free format text:** LAPSE BECAUSE OF NON-PAYME OF DUE FEES **Effective date:** 20141231 **Ref country code:** GB **Free format text:** LAPSE BECAUSE OF NON-PAYME OF DUE FEES

			Effective date: 20141203 Ref country code: LI Free format text: LAPSE BECAUSE OF NON-PAYMEI OF DUE FEES Effective date: 20141231
2015-11-10	REG	Reference to a national code	Ref country code: FR Ref legal event code: PLFP Year of fee payment: 6
2016-11-11	REG	Reference to a national code	Ref country code: FR Ref legal event code: PLFP Year of fee payment: 7
2017-10-12	REG	Reference to a national code	Ref country code: FR Ref legal event code: PLFP Year of fee payment: 8
2018-10-11	REG	Reference to a national code	Ref country code: FR Ref legal event code: PLFP Year of fee payment: 9
2021-05-04	REG	Reference to a national code	Ref country code: DE Ref legal event code: R081 Ref document number: 502015000798 Country of ref document: E Owner name: AMAZONEN-WERKE H. DREYER SE & C KG, DE Free format text: FORMER OWNER: AMAZONEN-WER H. DREYER GMBH & CO. K 49205 HASBERGEN, DE
2022-01-31	PGFP	Annual fee paid to national office [announced via postgrant information from national office to epo]	Ref country code: FR Payment date: 20211109 Year of fee payment: 12 Ref country code: AT Payment date: 20211129 Year of fee payment: 12 Ref country code: DE Payment date: 20211012 Year of fee payment: 12 Ref country code: SE Payment date: 20211110 Year of fee payment: 12
2022-02-28	PGFP	Annual fee paid to national office [announced via postgrant information from national office to epo]	Ref country code: IT Payment date: 20211115 Year of fee payment: 12
2022-04-04	PGFP	Annual fee paid to national office [announced via postgrant information from national office to epo]	Ref country code: PL Payment date: 20211022 Year of fee payment: 12

Concepts

machine-extracted

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Name	Image	Sections	Count	Query match
soil		claims,description	31	0.000
coupling		claims	1	0.000
coupling process		claims	1	0.000
coupling reaction		claims	1	0.000
sowing		claims	1	0.000

Show all concepts from the description section

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(19) Europäisches Patentamt
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(11) EP 2 335 465 B1

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(54) **Landmaschine**

Agricultural machine

Machine agricole

(84) Benannte Vertragsstaaten:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

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(73) Patentinhaber: **Amazonen-Werke H. Dreyer GmbH & Co. KG**
49205 Hasbergen (DE)

(72) Erfinder: **Pokriefke, Michael**
27798, Hude (DE)

(56) Entgegenhaltungen:
EP-A2- 0 171 719
DE-A1-102006 034 798
US-A1- 2009 020 053

Anmerkung: Innerhalb von neun Monaten nach Bekanntmachung des Hinweises auf die Erteilung des europäischen Patents im Europäischen Patentblatt kann jedermann nach Maßgabe der Ausführungsordnung beim Europäischen Patentamt gegen dieses Patent Einspruch einlegen. Der Einspruch gilt erst als eingelegt, wenn die Einspruchsgebühr entrichtet worden ist. (Art. 99(1) Europäisches Patentübereinkommen).

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EP 2 335 465 B1

Beschreibung

[0001] Die Erfindung betrifft eine Landmaschine gemäß des Oberbegriffes des Patentanspruches 1.

[0002] Eine derartige Landmaschine ist beispielsweise durch die DE 10 2006 034 798 A1 bekannt. Diese Landmaschine ist als Sämaschine ausgebildet. Hierbei kann der Maschinenrahmen um eine quer zur Fahrtrichtung verlaufende Schwenkachse mittels einer motorischen Stelleinrichtung verstellt werden, um eine Anpassung der Säschare an die Bodenkontur zu erreichen, damit möglichst eine gleichmäßige Arbeitstiefe bzw. Ablagetiefe des auszubringenden Saatgutes sichergestellt ist. Die Anordnung und Ausgestaltung des Maschinenrahmens zur Anpassung der als Säschare ausgebildeten Bodenbearbeitungselemente ist relativ aufwendig.

[0003] Der Erfindung liegt die Aufgabe zugrunde, in einfacher Weise eine gleichmäßige Bearbeitungstiefe von Bodenbearbeitungswerkzeugen und/oder Ablagetiefe des abzulegenden Saatgutes durch Bodenbearbeitungselemente und/oder Säschare erreichen zu können.

[0004] Diese Aufgabe wird erfindungsgemäß durch die kennzeichnenden Merkmale des Patentanspruches 1 gelöst. Infolge dieser Maßnahmen wird in einfacher Weise die Lage der Bodenbearbeitungselemente zum Maschinenrahmen abgefragt und der Maschinenrahmen soweit nachgestellt, dass die Bodenbearbeitungselemente in der ersten Querreihe sich in der gleichen Lage zu dem Maschinenrahmen wie die Bodenbearbeitungselemente der hinteren Querreihe befinden. Somit ist also in überraschend einfacher Weise nur durch die Verstellung des Maschinenrahmens, an dem die Bodenbearbeitungselemente angeordnet sind, bei unebenen und sich ändernden Bodenoberflächen eine gleichmäßige Bearbeitungstiefe zu erreichen.

[0005] Somit wird in einfacher Weise eine bodenparallele Ausrichtung des Tragrahmens durch die Abtastung der Bodenparallelität mittels der Ermittlung der Winkellage bzw. Lage der Bodenbearbeitungselemente ermöglicht. Somit lässt sich in einfacher Weise die Arbeitstiefe beim Überqueren von Senken und Bergkuppen in überraschend einfacher Weise erreichen. Es findet also ein einfacher Abgleich der Winkelstellung zwischen dem Bodenbearbeitungselement der vorderen und hinteren Querreihe statt.

[0006] Um die Landmaschine in einfacher Weise als Sämaschine einsetzen zu können, ist vorgesehen, dass die als Arbeitseinheit ausgebildete Säeinheit zumindest ein Säschar mit Tiefenführungs- und/oder Druckrolle umfasst.

[0007] Weitere Einzelheiten der Erfindung sind der Beispielsbeschreibung und den Zeichnungen zu entnehmen. Hierbei zeigen

Fig. 1 die Landmaschine in Seitenansicht und Prinzipdarstellung beim Überqueren einer Bergkuppe ohne Nachstellung des Maschinenrahmens gegenüber dem Tragrahmen,

Fig. 2 den an dem Tragrahmen angeordneten Maschinenrahmen mit Säscharen und Tiefenführungsrollen gemäß Fig. 1 in vergrößertem Maßstab,

Fig. 3 die Landmaschine in Seitenansicht und Prinzipdarstellung beim Überqueren einer Bergkuppe mit Nachstellung des Maschinenrahmens gegenüber dem Tragrahmen,

Fig. 4 den an dem Tragrahmen angeordneten Maschinenrahmen mit Säscharen und Tiefenführungsrollen gemäß Fig. 3 in vergrößertem Maßstab,

Fig. 5 die Landmaschine in Seitenansicht und Prinzipdarstellung beim Überqueren einer Senke mit Nachstellung des Maschinenrahmens gegenüber dem Tragrahmen und

Fig. 6 den an dem Tragrahmen angeordneten Maschinenrahmen mit Säscharen und Tiefenführungsrollen gemäß Fig. 5 in vergrößertem Maßstab.

[0008] Die Landmaschine ist als aufgesattelte Sämaschine ausgebildet. Die Sämaschine weist einen Maschinenrahmen 1 auf, der über ein Fahrwerk 2 auf dem Boden abgestützt ist. Der Maschinenrahmen 1 weist auf seiner Vorderseite eine Zugvorrichtung 3 auf, die mit den Anhängevorrichtungen 4 des die Landmaschine ziehenden Schleppers 5 gekuppelt ist.

[0009] Auf der Rückseite des Maschinenrahmens 1 ist ein Tragrahmen 6 angeordnet. An diesem Tragrahmen 6 ist eine Arbeitseinheit 7 angeordnet. Die Arbeitseinheit 7 umfasst als Säschare 8 ausgebildete Bodenbearbeitungselemente mit zugeordneten Tiefenführung- und/oder Druckrollen 9. Die als Säschare 8 ausgebildeten Bodenbearbeitungselemente sind im Ausführungsbeispiel in drei Querreihen mit Abstand zueinander hintereinander angeordnet. Die Bodenbearbeitungselemente 8 mit den zugeordneten Tiefenführungsrollen 9 sind jeweils mittels eines Haltearmes 10 mit einer Gelenkverbindung 11 in Höhenrichtung bewegbar an den beabstandet zueinander angeordneten Querbalken 12 des Tragrahmens 6 angeordnet. Die Bodenbearbeitungselemente 8 werden durch zwischen den Haltearmen 10 der Bodenbearbeitungselemente 8 und den Querbalken 12 angeordneten, nicht dargestellten Federelementen gegen den Boden 13 gedrückt. Diese Federelemente können beispielsweise als bekannte Gummilagerungen ausgebildet sein. Hierbei wird die Federkraft durch Verdrehen der verdrehbar am Tragrahmen 6 angeordneten Querbalken 12 mittels der als Hydraulikzylinder 14 ausgebildeten Stellmittel durch die Gummielemente aufgebracht.

[0010] Der Tragrahmen 6 ist mittels einer Gelenkanordnung 15 an den Maschinenrahmen 1 angebracht. Die-

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se Gelenkanordnung 15 weist eine quer zur Fahrtrichtung 16 verlaufende Schwenkachse 17 auf. Weiterhin ist zwischen dem Tragrahmen 6 und dem Maschinenrahmen 1 zumindest eine als Hydraulikzylinder 18 ausgebildete motorische Stelleinrichtung angeordnet. Mittels dieses Hydraulikzylinders 18 ist der Tragrahmen 6 mit den daran angeordneten Bodenbearbeitungselementen 8 und zugeordneten Rollen 9 um die quer zur Fahrtrichtung 16 verlaufende Schwenkachse 18 zu verschwenken.

[0011] Wie die Fig. 1 und 2 zeigen wird beim Überfahren einer Bodenkuppe 19 nicht mehr sichergestellt, dass alle Säschare 8 in den Boden 13 eindringen bzw. gleichmäßig tief in den Boden 13 eindringen, um den Boden 13 zu bearbeiten bzw. das auszubringende Saatgut abzulegen, wie den Fig. 1 und 2 zeigen. In der darstellten Situation befindet sich der Maschinenrahmen 1 bzw. die durch die Tragbalken 12 gezogene Linie nicht mehr parallel zu der zu bearbeitenden Bodenoberfläche 13. Aufgrund der Federanordnung werden die Säschare 8 zwar nach unten gedrückt, aber da der Tragrahmen 6 sich nicht parallel zur Bodenoberfläche befindet, kann er sich auch nicht der Form der Bodenoberfläche 13 anpassen.

[0012] Um hier Abhilfe zu schaffen muss der Tragrahmen 6 mittels des Hydraulikzylinders 18 um die durch die Gelenkanordnung 15 verlaufende Schwenkachse 17 verschwenkt werden, wie die Fig. 3 und 4 zeigen. Nach der Verschwenkung befindet sich der Tragrahmen 6 parallel zur zu bearbeitenden Bodenoberfläche 13, so dass alle Säschare 8 gleich tief in den Boden 13 eindringen und die Rollen 9 mittels der Federkraft gegen den Boden 13 gedrückt werden.

[0013] Um dieses automatisch zu erreichen, ist jeweils einem Bodenbearbeitungselement 8 der vorderen Querreihe und der hinteren Querreihe ein Sensorelement 20 zur Erfassung der Auslenkung des Haltearmes 10 des Bodenbearbeitungselementes 8 gegenüber dem Tragrahmen 6 zugeordnet. Dieser Sensor 20 sendet Signale und Daten an einem auf dem Schlepper 5 angeordneten Bordcomputer 21. In dem Speicher des Bordcomputers 21 ist ein Auswerteprogramm hinterlegt, mittels welchem die Steuerelemente der motorischen Stelleinrichtung 18 vom Bordcomputer 21 derart angesteuert werden, das durch Verschwenken des Tragrahmens 6 durch die Stelleinrichtung 18 die Auslenkung der Bodenbearbeitungselemente 8 der ersten Querreihe zumindest annähernd gleich der Auslenkung der Bodenbearbeitungselemente 8 der hinteren Querreihe gegenüber dem Tragrahmen 6 ist, wie die Fig. 3 und 4 zeigen. Mittels dieses Auswerteprogramms des Bordcomputers 21 und der Erfassung der Lage der Haltearme 10 der Bodenbearbeitungselemente 8 gegenüber dem Tragrahmen 6 ist während des gesamten Bearbeitungsvorganges die Lage des Tragrahmens 6 zu den Bodenbearbeitungselementen 8 und somit zur Kontur der Bodenoberfläche 13 einstellbar und die Auslenkung der Bodenbearbeitungselemente 8 der hinteren Querreihe gegenüber dem Tragrahmen 6 und die Auslenkung der Bodenbearbeitungselemente 8 gegenüber der ersten Querreihe zumindest annähernd gleich einzustellen und zu halten. Somit wird also eine gleichmäßige Eindingtiefe der Bodenbearbeitungselemente 8 bzw. der Säschare in den Boden 13 erreicht. Durch einen einfachen Abgleich der Winkelwerte zwischen den Bodenbearbeitungselementen 8 der ersten Querreihe und den Bodenbearbeitungselementen 8 der hinteren Querreihe gegenüber dem Tragrahmen 6 kann über die Einstellung des Tragrahmens 6 eine Anpassung an das Bodenniveau bzw. -verlauf in einfacher Weise erzielt werden.

[0014] In den Fig. 4 und 5 ist die Situation dargestellt, wenn die Landmaschine eine Senke 22 durchfährt. Auch hier erfolgt ein Verschwenken des Tragrahmens 6 über den Hydraulikzylinder 18 aufgrund der an den Bordcomputer 21 ausgewerteten Signale, so dass hier der Tragrahmen 6 entgegensetzt zu der Einstellung gemäß Fig. 3 und 4 verschwenkt wird.

Patentansprüche

1. Landmaschine, insbesondere aufgesattelte Sämaschine, mit einem Maschinenrahmen, der über ein Fahrwerk auf dem Boden abgestützt ist, sowie zumindest einer an einem Tragrahmen angeordneten Arbeitseinheit, umfassend Bodenbearbeitungselemente mit zugeordneten Tiefenführungs- und/oder Druckrollen, wobei die Bodenbearbeitungselemente mit den zugeordneten Tiefenführungs- und/oder Druckrollen in Höhenrichtung bewegbar angeordnet und mittels Federelementen gegen den Boden gedrückt werden, wobei der Tragrahmen mittels einer Gelenkanordnung an dem Maschinenrahmen um eine quer zur Fahrtrichtung verlaufende Schwenkachse mittels einer motorischen Stelleinrichtung verschwenkbar angeordnet ist, wobei die Bodenbearbeitungselemente in zumindest zwei Querreihen beabstandet hintereinander angeordnet sind, **dadurch gekennzeichnet, dass** jeweils zumindest einem Bodenbearbeitungselement (8) der vorderen Querreihe und hinteren Querreihe jeweils ein Sensorelement (20) zur Erfassung der Auslenkung des Bodenbearbeitungselementes (8) gegenüber dem Tragrahmen (6) zugeordnet ist, dass die Landmaschine mit einem Bordcomputer (21) verbunden ist, dass die Sensorelemente (20) Signale an den Bordcomputer (21) übermitteln, dass die motorische Stelleinrichtung (18) vom Bordcomputer (21) aufgrund eines im Speicher des Bordcomputers (21) hinterlegten Auswerteprogramms derart ansteuerbar ist, dass durch Verschwenken des Tragrahmens (6) durch die Stelleinrichtung (18) die Auslenkung der Bodenbearbeitungselemente (8) der ersten Querreihe zumindest annähernd gleich der Auslenkung der Bodenbearbeitungselemente (8) der hinteren Querreihe gegenüber dem Tragrahmen (6) während des gesamten Bearbeitungsvorganges einstellbar und/

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oder zu halten ist.

2. Landmaschine nach Anspruch 1, **dadurch gekennzeichnet, dass** die Arbeitseinheit (7) eine Säeinheit mit zumindest einem Säschar (8) mit Tiefenführungs- und/oder Druckrolle (9) umfasst.

Claims

1. Agricultural machine, in particular a semi-mounted seed drill, having a machine frame supported on the ground by a running gear and at least one work unit disposed on a supporting frame, comprising soil cultivating elements having associated depth control rollers and/or pressure rollers, wherein the soil cultivating elements having the associated depth control rollers and/or pressure rollers are arranged so as to be movable in the vertical direction and are pressed against the ground by means of spring elements, wherein the supporting frame is arranged on the machine frame by means of an articulated coupling such that it can be pivoted by means of a motor-driven actuating device about a pivot axle running transversely to the direction of travel, wherein the soil cultivating elements are arranged one behind the other, at a distance apart, in at least two cross-rows, **characterized in that** a sensor element (20) for registering the deflection of the soil cultivating element (8) in relation to the supporting frame (6) is respectively assigned to at least one soil cultivating element (8) of the front cross-row and of the rear cross-row, **in that** the agricultural machine is connected to an on-board computer (21), **in that** the sensor elements (20) transmit signals to the on-board computer (21), **in that** the motor-driven actuating device (18) can be controlled by the on-board computer (21), on the basis of an evaluation program stored in the memory of the on-board computer (21), in such a way that, through pivoting of the supporting frame (6) by the actuating device (18), the deflection of the soil cultivating elements (8) of the first cross-row can be set and/or kept at least approximately equal to the deflection of the soil cultivating elements (8) of the rear cross-row in relation to the supporting frame (6) throughout the cultivating operation.

2. Agricultural machine according to Claim 1, **characterized in that** the work unit (7) comprises a sowing unit having at least one seed coulter (8) with depth control roller and/or pressure roller (9).

Revendications

1. Machine agricole, notamment semoir attelé comportant un cadre de machine s'appuyant sur le sol par un châssis ainsi qu'au moins une unité de travail installée sur un châssis de support comprenant :

   - des éléments de travail du sol auxquels sont associées des roues de jauge et/ou des roues de compactage,

     * les éléments de travail étant mobiles en hauteur par les roues de jauge et/ou de compactage associées et poussés contre le sol par des éléments de ressort,
     * le châssis de support étant monté pivotant par un dispositif d'articulation sur le cadre de la machine autour d'un axe de pivotement dirigé transversalement à la direction de déplacement par l'intermédiaire d'une installation d'actionnement à moteur,
     * les éléments de travail du sol étant installés les uns derrière les autres dans au moins deux rangées transversales écartées l'une de l'autre,

   machine agricole **caractérisée en ce que**
   - chaque fois au moins l'un des éléments de travail du sol (8) de la rangée transversale avant et de la rangée transversale arrière est associé à un capteur (20) pour détecter le débattement des éléments de travail (8) par rapport au châssis de support (6),
   - la machine agricole est reliée à un ordinateur de bord (21),
   - les capteurs (20) transmettent des signaux à l'ordinateur de bord (21),
   - l'installation d'actionnement à moteur (18) est commandée par l'ordinateur de bord (21) en fonction d'un programme d'exploitation installé dans la mémoire de l'ordinateur de bord (21) de façon que le pivotement du châssis de support (6) par l'installation d'actionnement (18), règle le débattement des éléments de travail (8) de la première rangée transversale et/ou le tient au moins sensiblement de façon identique au débattement des éléments de travail du sol (8) de la dernière rangée transversale par rapport au châssis de support (6) pendant toute la phase de travail.

2. Machine agricole selon la revendication 1, **caractérisée en ce que**
l'unité de travail (7) comporte une unité de semoir avec au moins un socle de semoir (8) et des roues de jauge et/ou de compactage (9).

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Fig.1

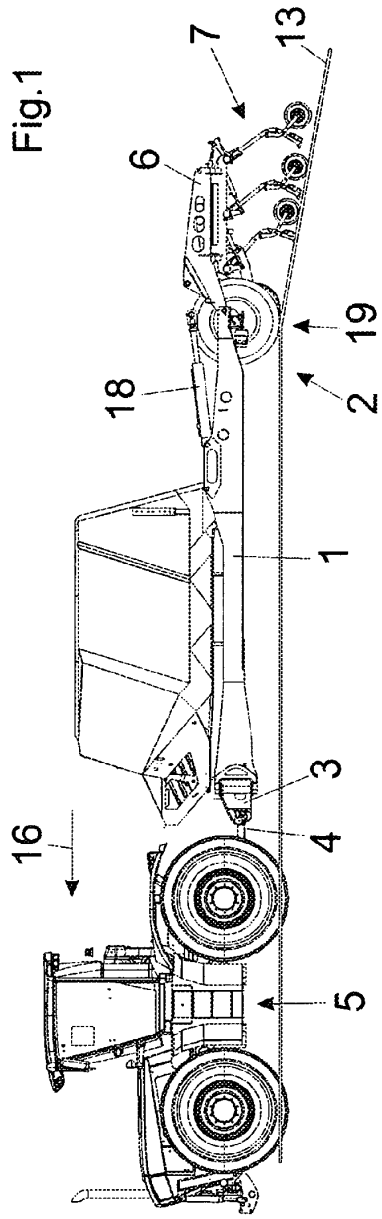
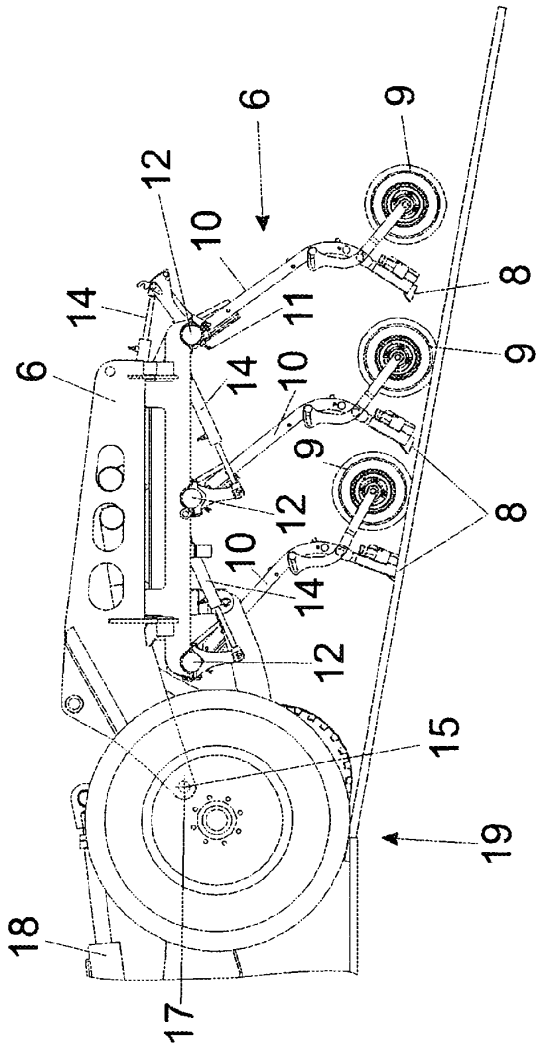


Fig.2



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Fig.3

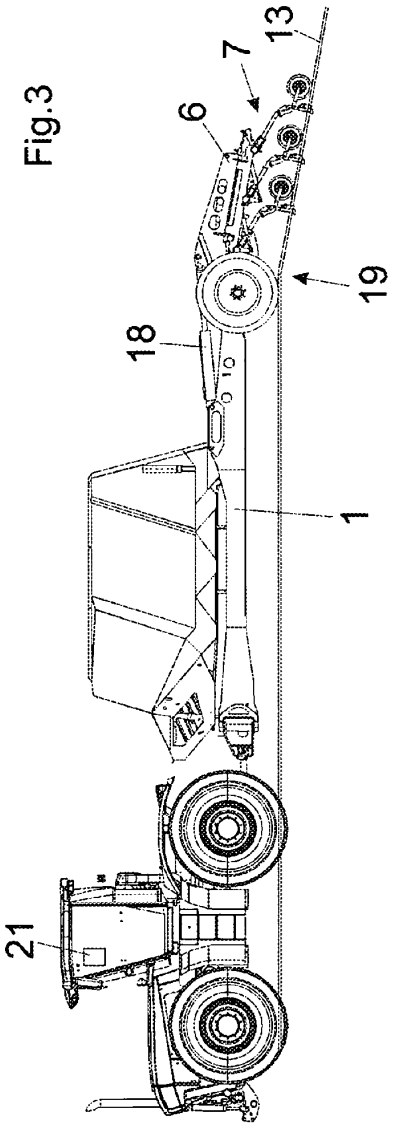
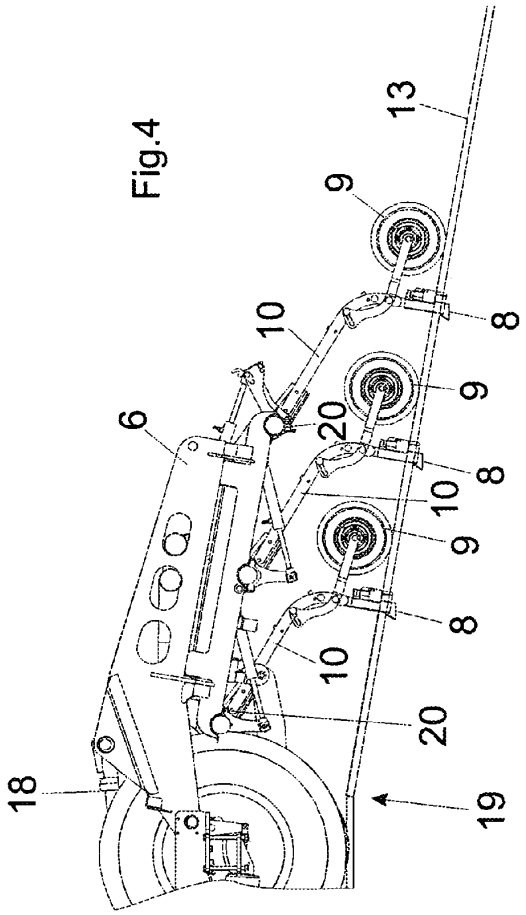


Fig.4



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Fig.5

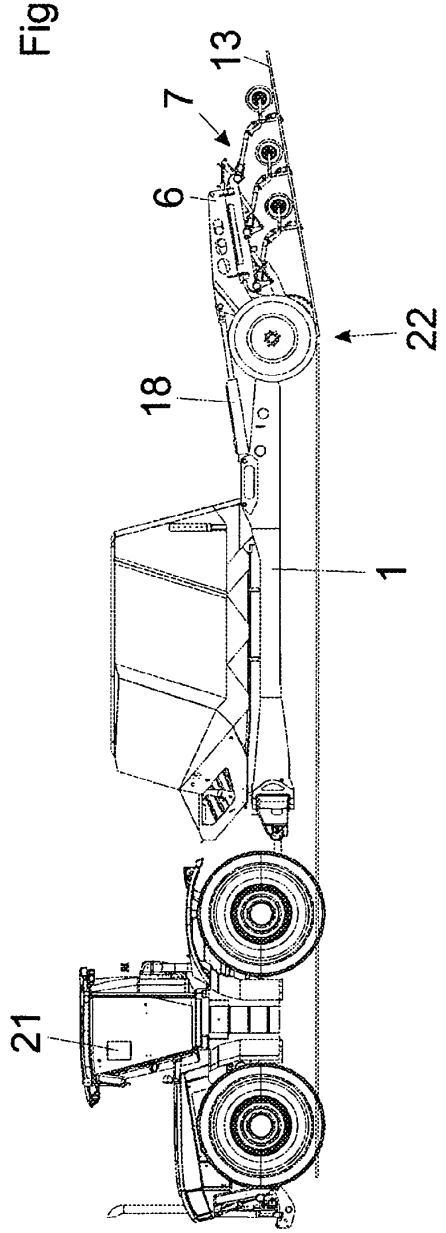
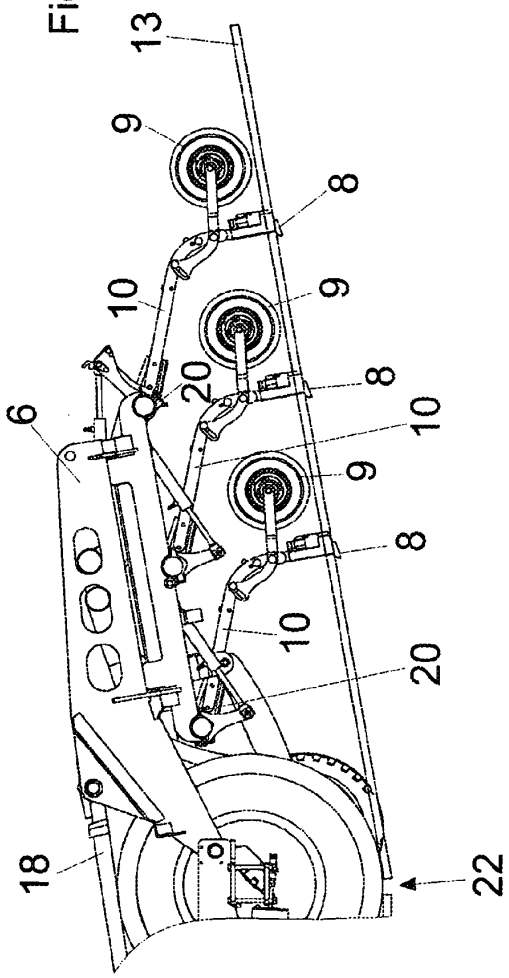


Fig.6



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IN DER BESCHREIBUNG AUFGEFÜHRTE DOKUMENTE

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In der Beschreibung aufgeführte Patentdokumente

- DE 102006034798 A1 **[0002]**

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INSTITUTO NACIONAL DA PROPRIEDADE INDUSTRIAL

08/18/2022 870220074436
18:08
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Submission of subsidies to the technical exam

Process Number: BR 11 2019 010534 4

Stakeholder Data

Interested 1 of 1

Name or Company Name: LEANDRO DE SOUZA CARVALHO

Person Type: Individual

CPF/CNPJ: 08941943728

Brazilian nationality

Physical Qualification: Other occupations not previously specified

Address: Rua São Sebastião, n°525 Bloco 11A Apto 204, São Sebastião

City: Petropolis

State: RJ

CEP: 25645-045

Country Brazil

Telephone:

Fax:

Email: leogargula@gmail.com

Reference Petition

Request: BR112019010534-4

PETICIONAMENTO ELETRÔNICO

This request was sent by the Electronic Petitioning system on 08/18/2022 at 18:08, Petition 870220074436

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Documents attached

Attachment Type	Name
clarification	OP1112BR00 Exam Subsidies .pdf
D1 US9301439B2	D1 US9301439B2.pdf
D2 US2015230391A1	D2 US2015230391A1.pdf
D3 EP2335465	D3 EP2335465.pdf
D4 DE102006034798B4	D4 DE102006034798B4.pdf
D5 US5065681A	D5 US5065681A.pdf
D6 US9031749B2	D6 US9031749B2.pdf
D7 US2003024450A1	D7 US2003024450A1.pdf
D8 US8857530B2	D8 US8857530B2.pdf

declaration of veracity

☑ I declare, under penalty of law, that all the information provided above is complete and true.

PETICIONAMENTO ELETRÔNICO

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Patent Application for Invention: **BR112019010534-4** of 05/23/2019
PCT: #PCT/IB2017/001298 of 10/26/2017
Priority: US #62/435,118 of 12/16/2016
Title: MACHINERY THAT CONTOUR TOOLBAR
Holder: **AGCO CORPORATION**

LEANDRO DE SOUZA CARVALHO, Brazilian, married, CPF 089.419.437-28, on condition of interested in the market and technologies related to agricultural machinery and implements, comes, timely, pursuant to article 31 of the Industrial Property Law (LPI), submit

SUBSIDIES TO THE TECHNICAL EXAMINATION

of patent application **BR112019010534-4,** entitled **"Machinery that goes around bar of tools",** filed on 05/23/2019 in the name of **AGCO CORPORATION, as** this does not meet the patentability requirements, and must be REJECTED in its entirety, by the reasons brought to the examination.

I - TIMELINESS:

1. As established in Article 31 of the Industrial Property Law No. 9,279 of 14 May 1996 (LPI), **LEANDRO DE SOUZA CARVALHO** comes, in legitimate interest, present documents and information to support the examination of the patent application in question.

> *"... Once the patent application is published and until the end of the examination, the presentation, interested parties, of documents and information to support the examination."*

II - PATENT REQUEST BR112019010534-4:

2. The present application concerns a **system** with a frame element (20), a toolbar (22) coupled to said frame element by means of a joint articulated, the tool bar (22) being parallel and at the rear of the frame element

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(20); row units coupled to the toolbar (22), a first sensor (50) coupled to the toolbar (22) to detect the position of the toolbar in relation to the to the floor and an actuator between the frame element (20) and the toolbar (22) to guide the toolbar containing said row units in relation to the element of frame based on the position of the toolbar in relation to the ground, detected by said sensor.

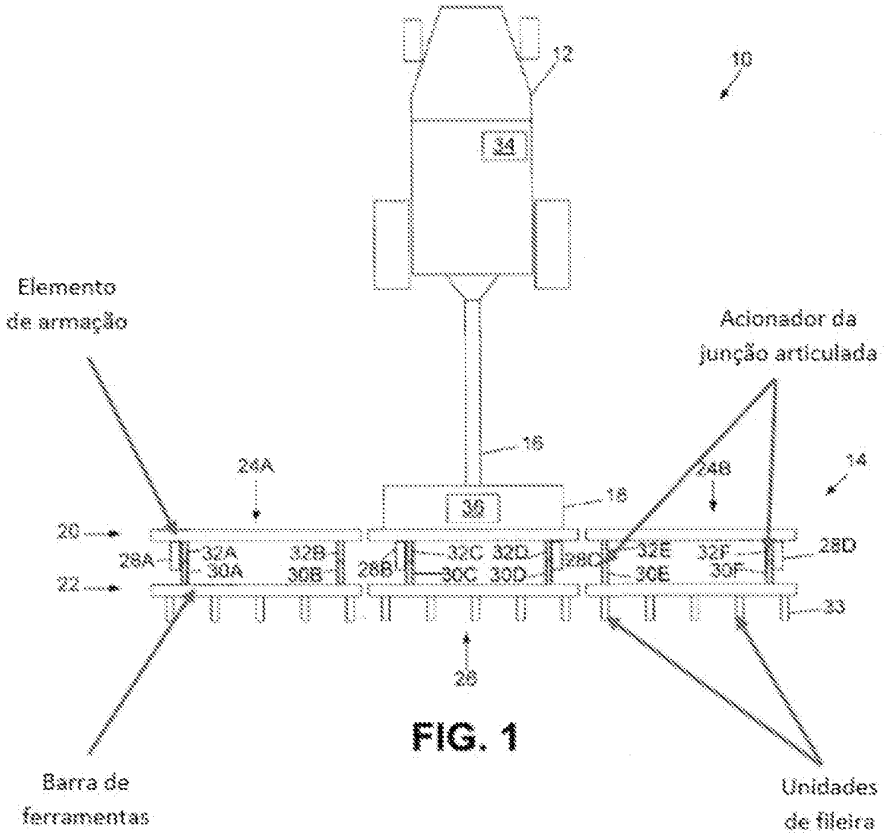


FIG. 1

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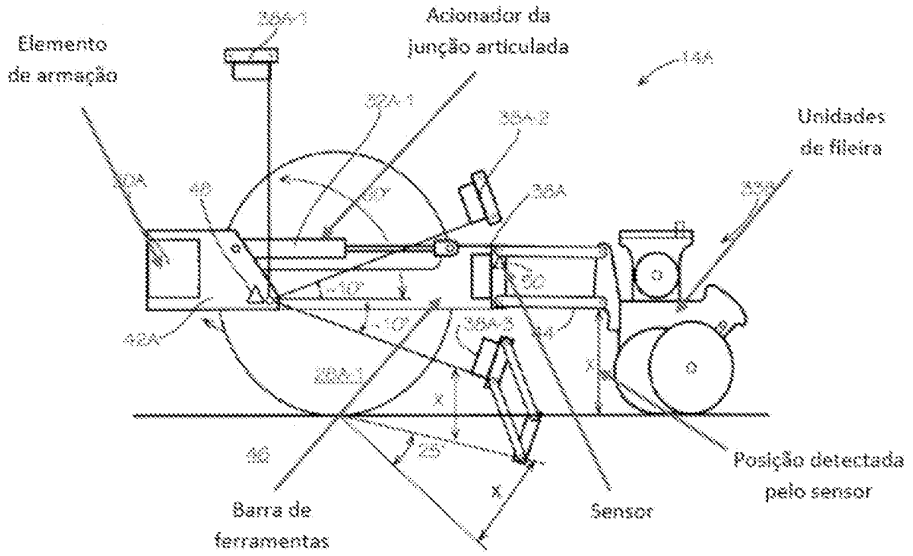


FIG. 3

III - ARTICLE 32 OF THE LPI

3. The Applicant initially highlights that the present patent application was the subject of preliminary requirement published under order 6.23 in the Industrial Property Magazine nº 2644 of 09/08/2021. In compliance with this requirement, the Holder filed a new Framework Amended claim, through petition No. 870210111916, stating that the amendments shown are limited to the insertion of the reference signs present in the drawings.

4. However, when analyzing the amendments presented, it is clear that the changes in the Claim Table went beyond the simple insertion of numerical references. In the board Claim filed, **the Holder withdrew essential elements of the claims 1 and 19,** and thus clearly expanding the scope of protection initially claimed, which is prohibited by article 32 of the LPI, as well as by Resolution No. 93/2013.

5. As can be seen from claims 1 and 19 highlighted below, we have features that have been entered (underlined in blue), as well as **features essentials that have been removed** (strikethrough in red):

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"1. System, **characterized by the fact that it** comprises:

an elongate frame member (20);

an elongated toolbar (22) coupled to the frame element (20) by means of an articulated joint, the toolbar (22) oriented parallel and at the rear of the frame element (20);

a plurality of row units (33) coupled to the toolbar (22);

a first sensor (50) coupled to the toolbar, the first sensor configured to detect a position of the toolbar (22) in relation to the floor; and

an actuator (32) coupled between the frame element (20) and the tools (22), the trigger (32) configured to rotate the toolbar (22) relative to the frame element (20) based on a detected position of the bar of tools (22)."

"19. Control system (74) for machinery characterized by the fact that comprises an elongated frame element (20) and a toolbar elongate (22) coupled to the frame element (20) at the rear of and parallel to the element to the frame by means of an articulated joint, in which attached to the tools (22) are a plurality of several row units (33), characterized by the fact that it comprises the control system comprising:

a controller (34);

one or more at least one sensors (48, 50, 80) configured to detect a the position of the toolbar (22) with respect to the floor; and

an actuator (32) coupled between the frame element (20) and the tools (22), in which the controller (34) is configured to receive at least a signal or signals from at least one or more sensors indicating the position of the tools (22) in relation to the ground and make the actuator (32) turn the tools (22) based on the detected position of the toolbar (22)."

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6. Regarding the added features (underlined in blue), we have that these, the principle, are allowed, since the addition of characteristics, in general, brings restriction to the matter initially claimed, in compliance with the provisions of article 32 of the IPL.

7. However, it should be noted that the element *"first sensor (50)"*, added to the new Independent Claim 1, was **initially claimed in Claim dependent 2 of the original Claims Board,** submitted for examination.

> 2. Sistema de acordo com a reivindicação 1, caracterizado pelo fato de ainda compreender um primeiro sensor acoplado à barra de ferramentas, o primeiro sensor configurado para detectar a posição da barra de ferramentas em relação ao chão, a posição da barra de ferramentas correspondendo a uma posição da unidade de fileiras em relação ao chão.

8. As noted in Dependent Claim 2 submitted for examination, the matter initially claimed defined a **specific arrangement for the first sensor (50),** i.e. that is, the first sensor (50) is a sensor **specifically coupled to the toolbar.**

9. Therefore, by inserting the element *"first sensor (50)"* in the new Claim independent 1, **the Holder could not omit the restriction already initially defined in the Dependent Claim 2 Original.** By deleting the snippet *"coupled to the toolbar tools"*, which determines a specific arrangement for the *"first sensor (50)"*, the Holder expands the possibilities for the arrangement of the sensor element in the claimed system, since it can be placed anywhere on the agricultural implement, contrary to article 32 of the LPI.

10. Likewise, also the removal of the section *"on the back of"* from the Claims independents 1 and 19 submitted for scrutiny **expands the scope of protection originally claimed.** By deleting the *"at the back of"* feature, which restricts placing the toolbar tools on the back of the frame element, the Holder expands the scope of protection initially claimed, since it makes it possible to infer that the toolbar can be positioned anywhere on the agricultural implement, i.e. on the front, side, etc., contrary to the provisions of article 32 of the LPI.

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11. Also in relation to Independent Claim 19, in complying with the requirement preliminary review, **the Holder transferred all the characteristics initially defined in the preamble of Claim 19 to after the expression "CHARACTERIZED BY FACT OF".** With this, all the characteristics already known in the state of the art become form part of the matter to be protected. Therefore, **there is no way to deny an affront to the provisions of article 32 of the LPI, since the expansion of the scope of protection is evident required.**

12. Thus, it can be concluded that the characteristics that were excluded from the claims independents 1 and 19 increase the scope of protection and therefore the present order does not meet the art. 32 of the LPI and item 2.2 of Resolution No. 93/2013.

13. In addition, independent Claims 1 and 19, although drafted as separate independent Claims, it is noted that these describe identical objects, differing only in that in **independent claim 19,** the *"controller"* is essential, and in **claim** 1, the *"controller"* is optional, which causes imprecision and lack of clarity of the claimed matter.

14. Therefore, independent Claim 19 does not present a set of characteristics alternatives to the object defined in independent claim 1; therefore, the claim independent 19 is contrary to the provisions of Art. 5th, II of Normative Instruction No. 30/2013 and item 3.24 of Resolution 124/2013.

IV - PATENTABILITY REQUIREMENTS:

15. According to Industrial Property Law No. 9,279 of May 14, 1996 (LPI), Article 8, *"An invention that meets the requirements of novelty, inventive step and industrial application".*

16. For the purposes of this law, the invention is endowed with novelty when not understood in the state of technique, as established in its Article 11 and of inventive step whenever, for a

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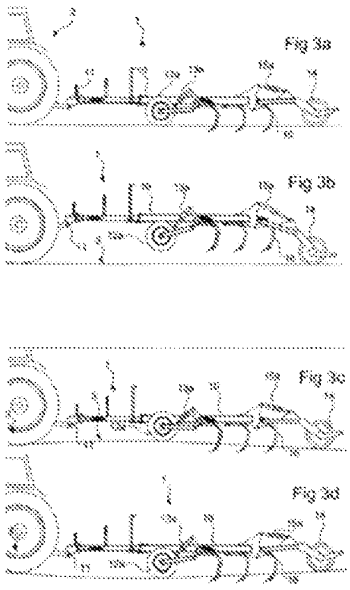
expert in the matter, does not arise in an evident or obvious way from the state of the art, as the its Article 13.

17. That said, the Applicant clarifies that the request in question, at least, DOES NOT INVOLVES INVENTIVE ACTIVITY compared to the state of the art known at the time of its deposit. Therefore, the present invention patent application does not comply with the provisions of Articles 8th c/c 13th of the LPI, as will be seen from the analysis of the documents now brought to the debate, which prevent the granting of the request under analysis here.

V - STATE OF THE TECHNIQUE:

D1: US9301439B2 - Agricultural implement and method for controlling an agricultural implement – published on 04/05/2016.

D1 refers to an agricultural implement for working the soil, self-propelled or towed, comprising a frame, first and second depth maintenance units comprising first and second hydraulic actuators
to adjust the height of the first and second units of maintenance of depth in relation to the structure, respectively, and at least one work tool of hitch with the ground. The first and second hydraulic actuators are connected to valves that supply hydraulic fluid to the system. A first side of the first hydraulic actuator is communicates with a first side of the second hydraulic actuator and a measurement engine configured to provide a measured value corresponding to a first quantity of hydraulic fluid occurring on said first sides.

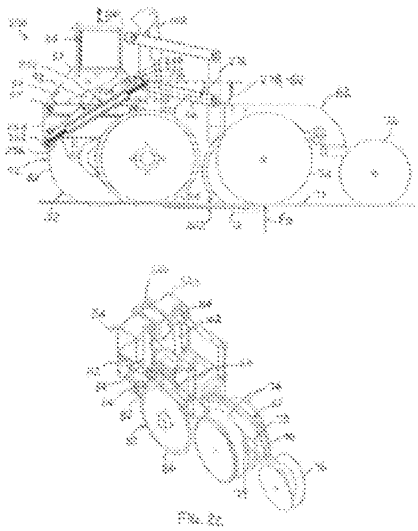


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D2: US2015230391A1 - Depth control for a seed planting system – published in 08/20/2015.



D2 refers to a planting system that includes a plurality of seeding row sets, each comprising components that are maintained at a controlled elevation. The seeding line set includes a controlled grow line unit for maintain a desired elevation relative to one unit of sowing line. Each set of line sowing can include two position sensors that generate signals corresponding to the elevation of the sowing line and to the attachment of hitch on the ground, respectively, or a differential position sensor that generates signals corresponding to the difference in elevations. Various modalities include a circuit controller closed location that adjusts the elevation of the crop row unit in relation to the crop row unit. seeding to a desired setpoint. In some embodiments, the downward force of the unit seeding line is actively controlled.

D3: EP2335465B1 – Agricultural machine – published on 05/23/2012.

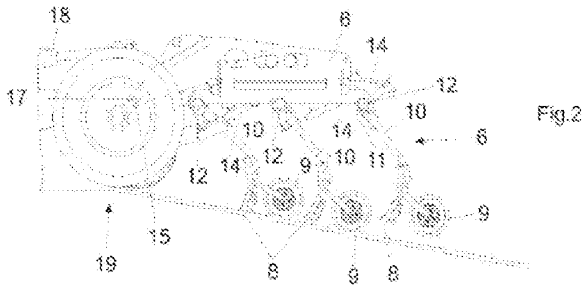


Fig.2

D3 refers to an agricultural machine, particularly a seeder, comprising a machine frame and a sensing element which is fixed to a ground working element for detecting the deflection of elements ground work against a structure of support. An on-board computer is coupled to the agricultural machine, where the sensor element transmits the signals to the on-board computer.

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D4: DE102006034798B4 – Agricultural machine ie semi-trailed seeder, for working on eg planar ground, has quadruplet articulation provided such that transverse support that makes rotary movement, during ascending movements of articulation - published on 02/13/2014.

D4 refers to a machine, for example a seeder, which has a joint quadruple proportioned in such a way that a transverse support makes a movement of rotation, during the upward movements of the articulation. The rotating movement of the support provides, in an operating position, in a region of a distant work unit of a rolling mechanism, a movement upward tension than in another region of the unit, where this last region is more away from the mechanism. The pivot points are spaced from each other by a small distance.

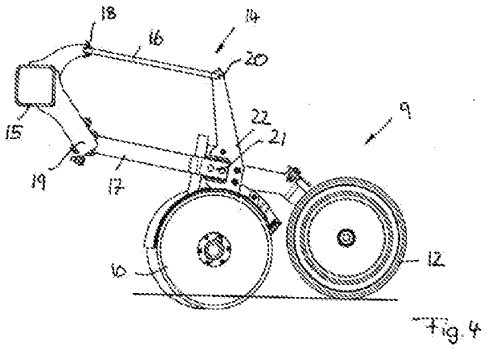
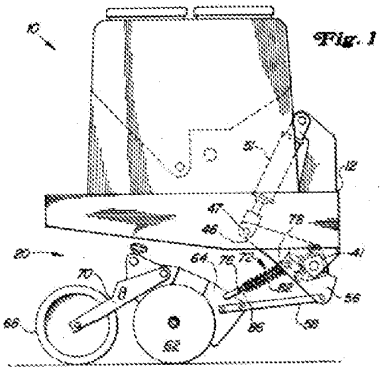


Fig. 4

D5: US5065681A – Hydraulic down pressure structure for an implement with multiple ground engaging tools – published on 11/19/1991.

D5 refers to an improved downward pressure arrangement for an implement, such as a multi-section row seeder, with structures of fixed height section with corresponding groups of opener sets. The opener sets of each group are flexibly inclined downwards by a spring frame and support operatively connected to a crankshaft. One crankshaft per group is supplied and each crankshaft is controlled by a single cylinder downward pressure adjustment. The cylinders are connected in parallel and to a pressure regulator to provide uniform, adjustable mean down pressure to the opener in uneven soil conditions. Tension links connected to the support structure allow the opener assemblies are lifted from a ground working position to a transport position.


Fig. 1

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D6: US9031749B2 – Cultivation air seeder having sequentially operated tools – published in 12/052015.

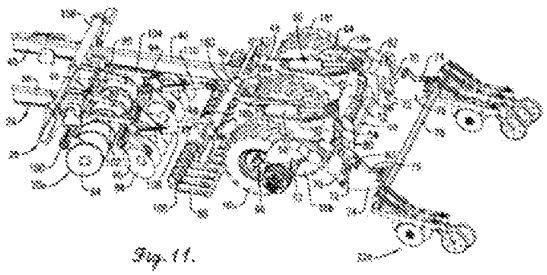
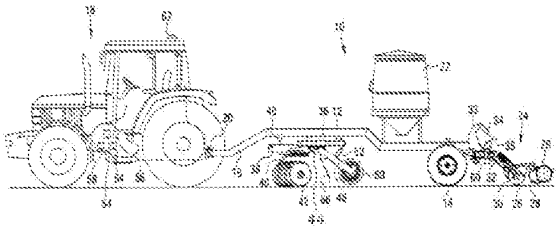


Fig. 11.

D6 refers to a seeder equipped with a dispenser for dispensing seeds from a hopper at a measured rate when the dispenser is activated. Groove openers are provided behind the growers to prepare furrows, which will receive seeds from the hopper when the openers are engaging the ground; where the openers are selectively liftable from a position lowered from ground engagement to a raised position where the openers do not make contact with the soil. An operation and control system deactivates the feeder and lifts the cultivators and openers in a predetermined sequence.

D7: US20030024450A1 – Controller for a cultivating and seeding machine – published 06/02/2003.



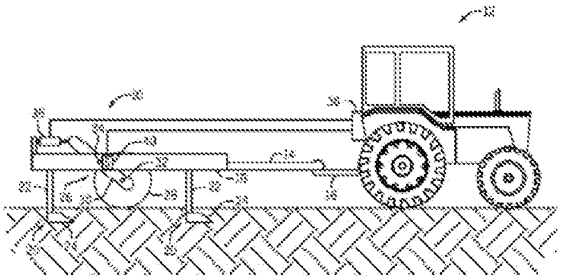
D7 refers to a cultivating machine and seeding supplied with a seeding unit sowing and tillage device and/or a roll of earth. the unit of Seeding is provided with an actuator for sowing, the tillage device is supplied with a tillage actuator and the earth roller is supplied with a earth roller actuator. The seeding actuator regulates the depth of the seeding unit, while the tillage and earth roller actuators regulate the downward pressure of these two implements, respectively. A controller that has a memory loaded with information to adjust working implements controls the various actuators in response to these data registers.

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D8: US8857530B2 – Automatic depth control system for an agricultural implement – published in 09/13/2012.

D8 refers to a system of



agricultural implement that includes a implement and a control unit fluid configured to be coupled to a towing vehicle. The system of agricultural implement also includes a depth control cylinder disposed on an implement chassis and fluidly coupled to the fluid control unit. O Depth control cylinder is configured to adjust the penetration depth of a implement ground penetrating tool by varying the height of a disc assembly hitch to the ground. In addition, the agricultural implement system includes a sensor coupled communicatively to the fluid control unit and configured to emit signals indicative of the penetration depth of the ground penetration tool. The fluid control unit is configured to automatically control fluid flow to the flow control cylinder depth based on signals sent by the sensor to maintain a penetration depth selected by the user.

VI - ABSENCE OF INVENTIVE ACTIVITY

18. Paragraph [002] of the application under review describes the problems of the state of the art, citing that current agricultural implements have long, rigid sections that do not operate well in fields with irregularities, such as depressions or plateaus that compromise the ability of rank units to operate properly in the field. For example, when a planter is faced with a plateau, the frame of the wheels suspends the units of rows, disengaging tools from the ground. On the other hand, as the wheels descend by the rear of the plateau, the entire weight of the frame rests on the row units, causing tools to penetrate the ground deeper than desired.
In both cases, the possible results harm productivity due to the depth in which the seeds are planted, be too shallow or too deep.

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19. The **solution** proposed in request **BR112019010534-4** comprises providing a system that includes a frame element, a toolbar attached to said frame, the toolbar being parallel and to the rear of the frame element and units of rows attached to the toolbar. Rotation of the toolbar containing the row units is controlled by a sensor attached to the toolbar, configured to detect a toolbar position relative to the ground; and a coupled trigger between the frame element and the toolbar, configured to rotate the toolbar tools relative to the frame element based on a detected bar position of tools.

20. In accordance with art. 5, items I and II of Normative Instruction No. 30, **Claims Independents must protect the technical characteristics essential to the realization of the invention.**

> **Art. 5º** As reivindicações independentes deverão cumprir as seguintes especificações:
>
> I. as reivindicações independentes visam a proteção de características técnicas essenciais e específicas da invenção em seu conceito integral, cabendo a cada categoria de reivindicação pelo menos uma reivindicação independente;
>
> II. cada reivindicação independente deve corresponder a um determinado conjunto de características essenciais à realização da invenção, sendo que somente será admitida mais de uma reivindicação independente da mesma categoria se tais reivindicações definirem diferentes conjuntos de características alternativas e essenciais à realização da invenção, ligadas pelo mesmo conceito inventivo;

21. As already mentioned in item IV of this rationale, the Claim Board presented in response to requirement 6.23 is at odds with the provisions of Art. 32 of the LPI. Therefore, according to item 2.5 of Resolution No. 93/2013, the Claim Boards that that fall under the provisions of article 32 of the LPI will be rejected in full.

22. Therefore, the analysis of the present request will be in view of the original Claim Table, that is, the valid Claims Framework, where independent Claims 1, 19 and 20 define:

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"1. System, **characterized by the fact** that it comprises:

a frame element;

a toolbar attached to the frame element through a hinged joint, the toolbar oriented **parallel and to the rear of the frame element;**

a row unit attached to the toolbar;

a first sensor coupled to the toolbar, the **first sensor** configured **to detect a boom position tools in relation to the ground;** and

a driver coupled between the **frame element** and the **toolbar, the trigger** set **to rotate** the **toolbar of tools in relation to the frame element based on a detected position of the toolbar.**

19. Control system for machinery **characterized by fact** that it comprises a **frame element** and **a tools attached to the frame element at the rear of the e parallel to the frame by means of an articulated joint,** in which **attached to the toolbar** are several **units of rows,** the control system comprising:

a controller;

at least **one sensor** configured **to detect the position of the toolbar in relation to the floor;** and

a driver coupled between the **frame element** and the **toolbar,** in which **the controller** is configured **to receive at least one signal from the at least** one sensor **indicating the position of the toolbar in relation to the floor** and make the

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trigger rotate toolbar based on *position*
detected from the toolbar.

20. Computer-implemented method for machinery
characterized by the fact *that it comprises a* ***bar of***
tools *that have* ***row units*** *attached to them,* ***the method***
to adjust a toolbar rotation *based on*
an outline of a field that the machinery traverses, the method
comprising:

in ***a controller:***

receive *an indication of a* ***first change of***
angle of the toolbar in relation to the floor;

make *a* ***trigger that pivotally couples*** *the*
toolbar *to* ***the frame element*** *to retract* ***based on***
in the indication of the first change of angle;

receive *an indication of* ***a second change of***
angle of the toolbar in relation to the floor; *and*

make *the* ***trigger*** *extend* ***based on the indication***
of the second angle change."

23. Thus, as established by the regulations, this request deals with a system, a control system for a machinery and a computer-implemented method for a machinery, comprising the following **TECHNICAL CHARACTERISTICS ESSENTIALS**:

I) a frame element;

II) a toolbar attached to the frame element by means of a hinged joint, the toolbar oriented parallel and at the rear of the frame element;

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III) a row unit attached to the toolbar;

IV) a first sensor coupled to the toolbar, the first sensor configured to detect a toolbar position relative to the ground;

and

V) a driver coupled between the frame element and the tools, the trigger set to rotate the toolbar relative to to the frame element based on a detected position of the tools.

24. Analyzing the essential technical characteristics against the state of the art, we have:

Document D1 - US9301439B2

25. D1 describes agricultural implements for work connected to the ground, where you want maintain the working depth of the work tools attached to the implement, at a uniform depth (see column 1, lines 65-67 of D1).

SUMMARY OF THE INVENTION

An object is therefore to provide an improved system for 65 adjusting the working depth or height of an agricultural implement.

26. Therefore, **D1** proposes a solution to the same technical problem as the present one. request seeks to remedy, as described in paragraph [002] of the descriptive report of the present request, namely, to keep the work tools coupled to the agricultural implement at a same depth of soil, even when the implement moves over terrain with plateaus or gullies.

27. To this end, the invention of **D1** provides for a hydraulic system comprising **actuators hydraulics** (13 and 15) controlled by a **control unit** (20), in response to signals

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generated by **the position sensors** (18, 19). Said **position sensors** (18, 19) can be angle sensors arranged on one or both hydraulic cylinders (13 and 15).

28. Figures 4 to 7 of **D1** refer to the use of a hydraulic system in a seeder precision, wherein hydraulic cylinders (113) are arranged between the cross beam (110) of the implement structure and planting units (116) and are controlled by position (118, 119).

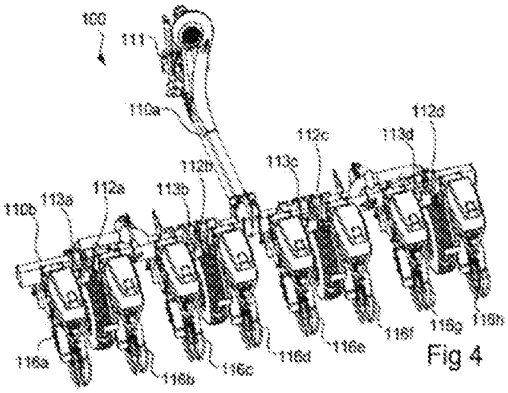


Fig 4

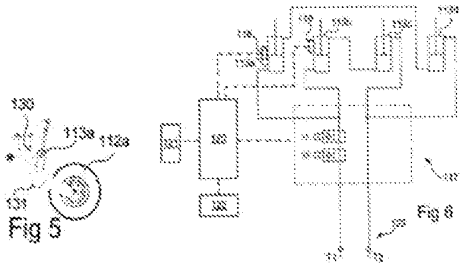


Fig 5

Fig 6

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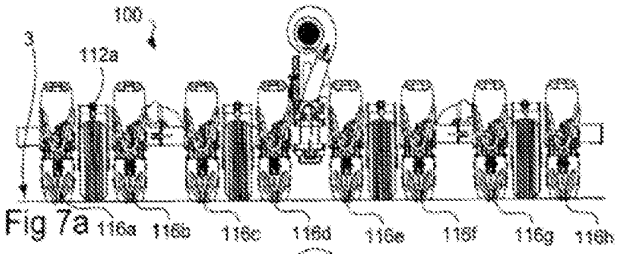


Fig 7a

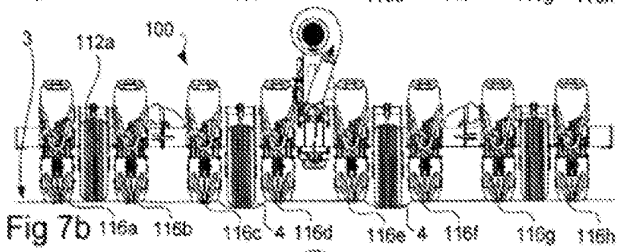


Fig 7b

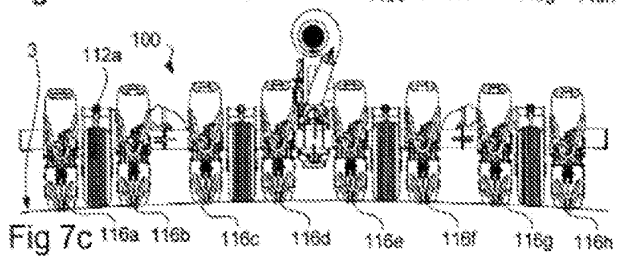


Fig 7c

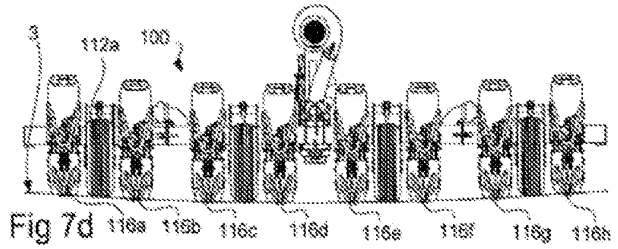


Fig 7d

29. Therefore, as in the patent application under analysis, **D1** already teaches to provide a **system** for agricultural implements, in which the toolbar is controlled through hydraulic actuators that respond to positions detected by position **sensors .**

30. That said, it is clear that the invention described in **D1** has the **characteristics techniques** described in the present patent application and solves the same technical problem introduced. Thus, **the invention of the present application is anticipated by the teachings of document D1.**

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Document D2 - US2015230391A1

31. Document **D2** describes a planting system that includes a plurality of seeding row sets, each having components held at an elevation controlled (see paragraphs [040] to [061]).

32. The applicant understands that **D2** has **a rigid frame (53) that couples both a crop row unit (52) pivotally as a toolbar (34), to which a plurality of planting row units (62) are coupled to the tools.**

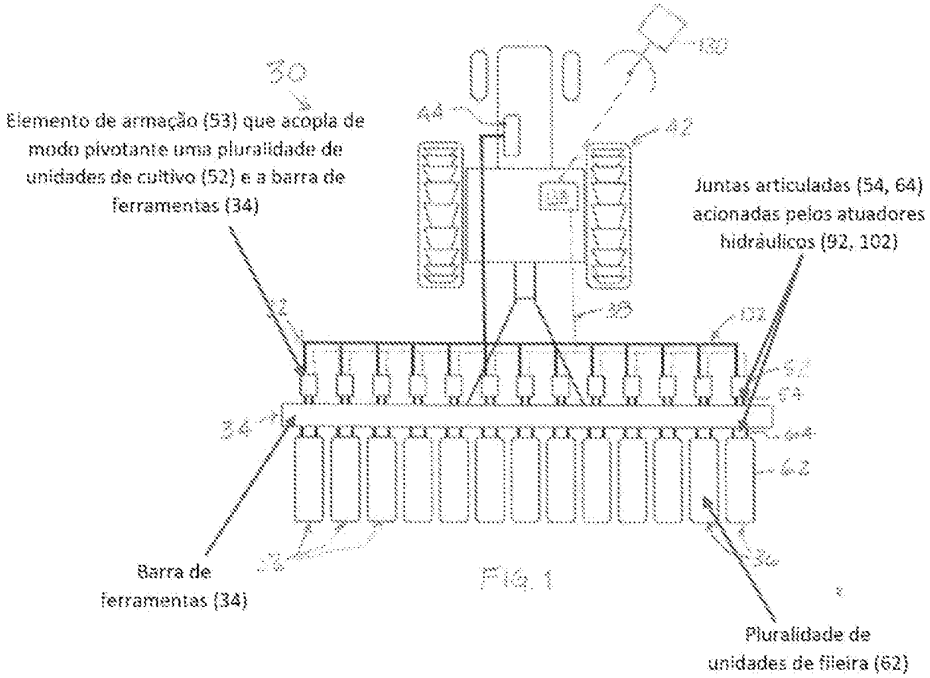


Fig. 1

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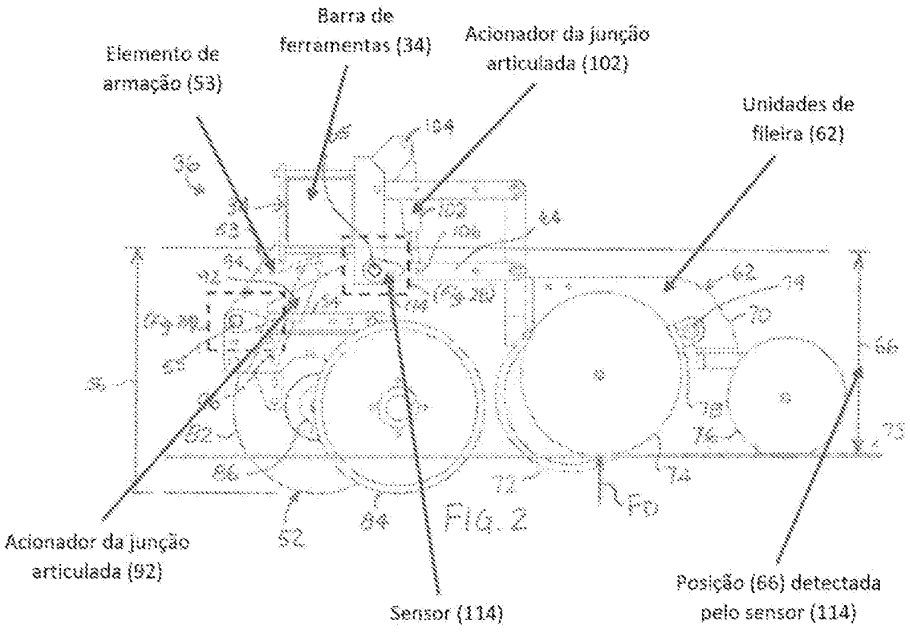


FIG. 2

33. According to **D2,** the disclosed system may include a crop line actuator (92) operationally coupled between the implement bar (34) and the row crop unit (52) or connection (54), to adjust the elevation (56) of the row crop unit (52) in with respect to the bar (34), wherein said crop row unit (52) is coupled to the frame of the implement (53).

> *"[0028] Each of the seed row assemblies 36 includes a ground engaging attachment or tillage row unit 52 coupled to a rigid frame 53 by a first linkage 54 operatively about a pivot 55, the rigid frame 53 depending from the implement frame 34."*

> *"[0030] Each of the seed row assemblies 36 can further include a tillage row actuator 92 operatively coupled between the implement frame 34 and the tillage row unit 52 or linkage 54, the tillage row actuator 92 including the base portion 94 and a free portion 96, the free portion 96 being translatable relative to the base portion and being operatively coupled with the tillage row unit 52 for*

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adjustment of the elevation 56 of the tillage row unit 52 relative to the implement frame 34."

34. Therefore, although the invention of **D2** differs from the present application in that it comprises a second joint linkage driver between the seeding row unit (62) and the bar (34), this **already anticipates the articulated joint driver between the frame (53) of the implement and the toolbar (34).**

35. In paragraph [0033] of **D2,** it is also described that each of the line sets of seeding 36 may further comprise a position detection module 110. In certain modalities, the position detection module 110 includes position sensors 112 and 114 operatively coupled to the first connection 54 and the second connection 64, respectively, which emit signals 116 and 118, respectively, corresponding to the detected position. The sensors of position 112 and 114 are arranged to detect an angular rotation of the respective connections 54 and 64 over their respective pivots 55 and 65, as represented in this document, for example by a rotary potentiometer.

[0033] Each of the seeding row assemblies **36** can further comprise a position sensing module **110**. In certain embodiments, the position sensing module **110** includes position sensors **112** and **114** operatively coupled to the first linkage **54** and the second linkage **64**, respectively, that output signals **116** and **118**, respectively, corresponding to the sensed position. The position sensors **112** and **114** are arranged to detect an angular rotation of the respective linkages **54** and **64** about their respective pivots **55** and **65**, as depicted herein, for example by a rotating potentiometer. In other embodiments, position sensing can be provided by magnetostrictive sensors or linear sliding devices, such as sliding potentiometers or linear variable differential transformers (LVDT). One embodiment of the position sensors **112**, **114** is discussed below attendant to FIG. **7**.

36. Paragraph [0035] of **D2** describes that in one embodiment, actuators 92 and 102 are linear hydraulic cylinders (as shown), which are operatively coupled to a hydraulic pressure circuit 132 which comes from, for example, the pressure source 44 of the trailer unit 42. The hydraulic pressure circuit may include origin 134 and return lines 136. Other types of actuators can also be

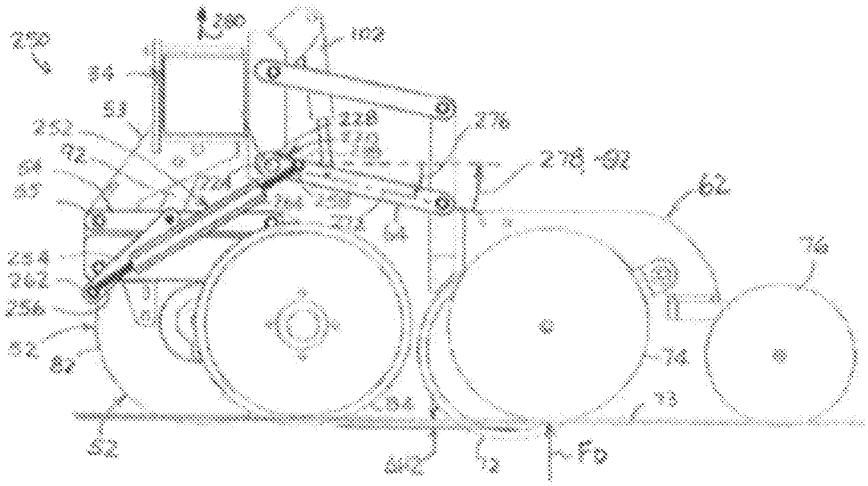
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implemented, such as hydraulic rotary actuators, pneumatic linear actuators or rotary actuators and/or linear or rotary actuators powered by an electric motor. In some modalities, all actuators are of the same type; other modalities use a mixture of types of actuators.

37.

> **[0035]** In one embodiment, the actuators **92** and **102** are linear hydraulic cylinders (as depicted), which are operatively coupled with a hydraulic pressure circuit **132** that is sourced, for example, the hydraulic pressure source **44** of the towing unit **42**. The hydraulic pressure circuit can include source lines **134** and return lines **136**. Other type actuators can also be implemented, such as rotational hydraulic actuators, linear or rotational pneumatic actuators, and/or linear or rotational actuators powered by an electric motor. In some embodiments, all actuators are of the same type; other embodiments utilize a mix of actuator types.



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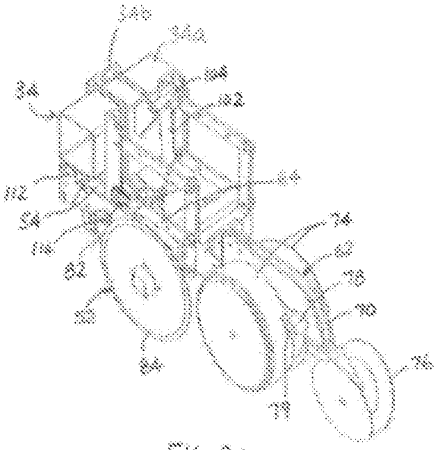


Fig. 2c

38. Therefore, the planting system described in **D2** features an **actuator,** such as a hydraulic cylinder, which acts to **pivot the toolbar based on the position detected by position sensors in relation to the ground.** The position sensor (112) is coupled to the first connection (54) of the frame (34) and the position sensor (114) is coupled to the second connection (64) of the line unit frame (52), as described in the order here contested.

39. It remains clear that the invention described in **D2** has the **technical characteristics** described in the present patent application and solves the same technical problem presented. Thus, **the invention of the present application is anticipated by the teachings of the D2 document.**

Document D3 - EP2335465

40. Document **D3** describes an agricultural machine comprising a frame of machine supported by a chassis; a **support structure** on which **a planting row** is coupled; a **hydraulic cylinder** is provided between the support structure and the support structure. machine; a **sensor element** is arranged in the planting line and is connected to a computer board, so that, according to the signals sent by the sensor, **the hydraulic cylinder**

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moves the support structure to maintain the deflection of the planting lines approximately equal (see paragraphs [008] to [013] of D3).

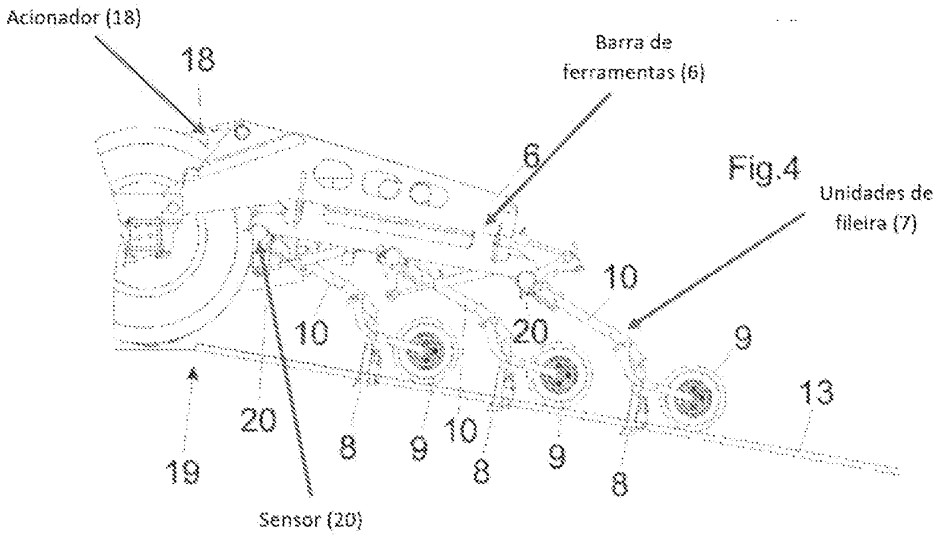


Fig.4

"[0009] On the back of the machine frame 1, a support frame 6 is arranged. THE working unit 7 is arranged on this support frame 6. The working unit 7 comprises soil cultivation elements designed as sowing coulters 8 with associated depth control and/or pressure rollers 9." (free translation)

"[0012] In order to remedy this situation, the support frame 6 must be pivoted about the pivot axis 17 running through the joint arrangement 15 by means of the hydraulic cylinder 18, as shown in FIGS. 3 and 4. After pivoting, the support frame 6 is parallel to the soil surface 13 to be processed, so that all coulters 8 penetrate the soil 13 to the same depth and the rollers 9 are pressed against the soil 13 by the spring force. (free translation)

[0013] In order to achieve this automatically, a sensor element 20 for detecting the deflection of the holding arm 10 of the soil cultivation element 8 relative to the support frame 6 is assigned to one soil cultivation element 8 of the front transverse row and the rear transverse row. This sensor 20 send signals and

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data to an on-board computer 21 arranged on the tractor 5. An evaluation program is stored in the memory of on-board computer 21, by means of which the control elements of motorized actuating device 18 are actuated by on-board computer 21 in such a way that, by pivoting support frame 6 using actuating device 18, the deflection of soil tillage elements 8 in the first transverse row is at least approximately equal to the deflection of soil cultivation elements 8 of the rear transverse row relative to the support frame 6, as shown in FIGS. 3 and 4 show. By means of this evaluation program of the on-board computer 21 and the detection of the position of the holding arms 10 of the soil tillage elements 8 relative to the support frame 6, the position of the support frame 6 relative to the soil tillage elements 8 and thus to the contour of the soil surface 13 can be adjusted during the entire tillage process and the deflection of the soil tillage elements 8 of the rear transverse row compared to the support frame 6 and the deflection of the soil working elements 8 compared to the first transverse row at least approximately the same and to keep. Thus, the uniform penetration depth of the tillage elements 8 or the seed coulters into the soil 13 is achieved." (Translation free)

41. As can be seen in Figure 3 (below) of the patent application under review, the sensor is arranged in the articulation of the row unit, so it **is clear that the order sensor patent in question is arranged in the same location as the sensor described in D3.** note, further, that in the present patent application, the Applicant described the characteristics of the system differently from that usually used by technicians in the subject of this technical field.

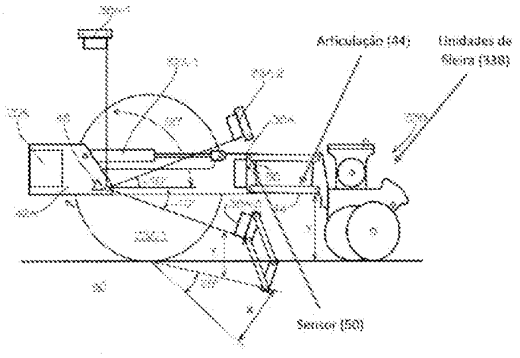


FIG. 3

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42. In addition, the Applicant understands that the place where the sensor is located is a mere choice of design and does not generate advantages for the invention under analysis, since the applicant itself in its response to requirement 6.23, excluded from independent claim 1 the definition of location where such a sensor was arranged (see **Item III** of the present examination subsidies). The report description of the patent application under analysis corroborates this understanding, since the paragraph **[027]** also reveals that to allow the toolbar to follow the outline of the field, information is received from a sensor about the relative position of the toolbar and, by extension, the relative position of the row unit relative to the ground. That is, the location where the sensor is placed, either in the toolbar or in the row unit, not interferes with the result achieved by the invention.

para todas as unidades de fileiras 33B. Em geral, para permitir que a barra de ferramentas 38A (e consequentemente, a barra de ferramentas 38A) siga o contorno do campo, são recebidas informações de sensor sobre a posição (relativa) da barra de ferramentas 38A (e por extensão, a posição relativa da unidade de fileiras 33B) em relação ao chão. Um

43. Thus, even though the Applicant of the present patent application claims that the sensor is arranged in a different location than the sensor described in **D3** (ie, the sensor is arranged in the unit of rows), for a person skilled in the art, it would be obvious to modify the location of the sensor, as such location is just a matter of design.

44. Finally, it is also understood that it would be obvious for a person skilled in the art to combine the teachings of **D1** or **D2** with **D3,** in order to achieve an invention such as the present patent application, i.e. a subject technician, in possession of the teachings of **D1** or **D2,** would be motivated to modify the **D3** machine , in order to achieve an invention such as the present patent application under review.

45. That said, it is clear that the invention described in **D3** has the **characteristics techniques** described in the present patent application and solves the same technical problem introduced. Thus, **the invention of the present application is anticipated by the teachings document D3, alone or in combination with D1 or D2.**

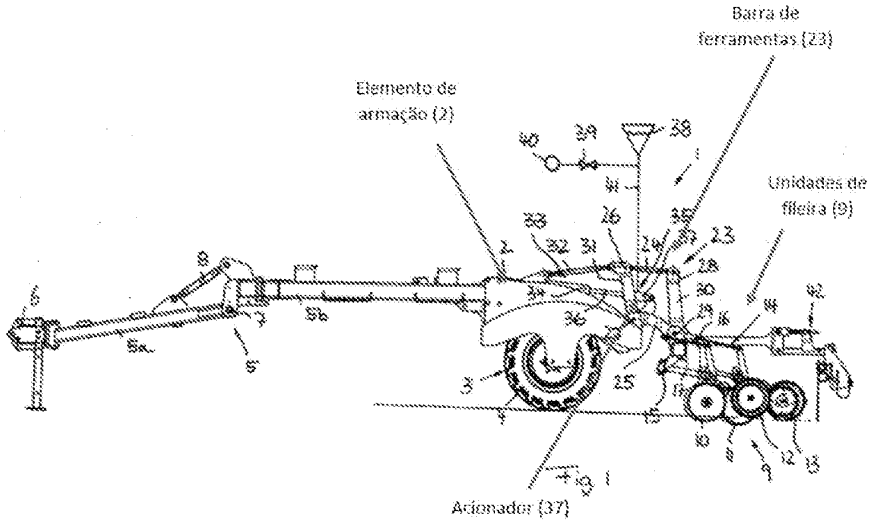
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Document D4 - DE102006034798

46. Document **D4** describes an agricultural machine 1, particularly a seeder, equipped with a **machine frame** 2, which in turn comprises **a chassis 3 and an axle drive** axle 5. One end of the drive axle 5a is connected to a tractor and the end 5b allows chassis 3 to tilt independently of tractor height, i.e. the inclination of the chassis 3 is adjusted by means of an actuator 8. **A planting line 9 is fixed in the machine frame** 2, and is articulated by means of a four-bar linkage 14 connected to a crossmember 15 arranged in the rear portion of the chassis 3, **so that the line of planting 9 can be moved up and down in relation to the transom 15.** Also, to being able to adjust the working depth without changing the geometry of the four-bar linkage 23, the upper pivot point 26 on the frame side of the machine 2 is designed to be adjustable. **A soil pressure adjustment device 35 is coupled to the planting line 9 and comprises a hydraulic cylinder 37** (see paragraphs [0025] to [0028] and [0031] to [0033] of D4).



"[0025] The sowing machine 1 shown in the figures comprises a machine frame 2 which is supported on the ground via a chassis 3 which, in the embodiment shown, has a single-axle design and has wheels 4. The machine frame 2 can be

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attached via a drawbar 5 to a tractor, not shown, by means of a coupling piece 6 at the front end of the drawbar, which allows pivoting of the drawbar 5 about an upright pivot axis. In the illustrated embodiment, the drawbar 5 also includes a front drawbar section 5a, which is connected to a rear drawbar section 5b so that it can pivot about a horizontal transverse axis 7, so that the inclination of the machine frame 2 is independent of the height of the tractor-side coupling piece by buckling the drawbar about the transverse axis 7 can be adjusted by means of an actuator 8." (free translation).

"[0026] A sowing unit 9 is fastened to the rear end of the machine frame 2 and is arranged following the chassis 3." (free translation).

"[0028] The sowing unit 9 is articulated via a first four-bar linkage 14 to a crossbeam 15 trailing behind the chassis 3 , so that the sowing unit 9 can be moved up and down in relation to the crossbeam 15". (free translation).

"[0031] In order to be able to adjust the working depth without changing the geometry of the four-bar linkage 23, the upper articulation point 26 on the machine frame side is designed to be adjustable." (free translation).

47. Also, **D4** proposes to solve the same inconveniences that the present request seeks solve by means of a planting line that better adapts to the contours of a terrain (see paragraph [0005] of D4).

48. Thus, although **D4** does not describe the presence of a sensor to perform the tilt of the planting line, a subject matter expert in possession of the teachings of **D1, D2 ,** or **D3,** would be motivated to modify the machine described by **D4,** adding a sensor so that the line of planting would better adapt to the sloping contours of the terrain, thus achieving a invention similar to that described by the patent application contested herein.

49. That said, it is clear that the invention described in **D4** has the **characteristics techniques** described in the present patent application and solves the same technical problem

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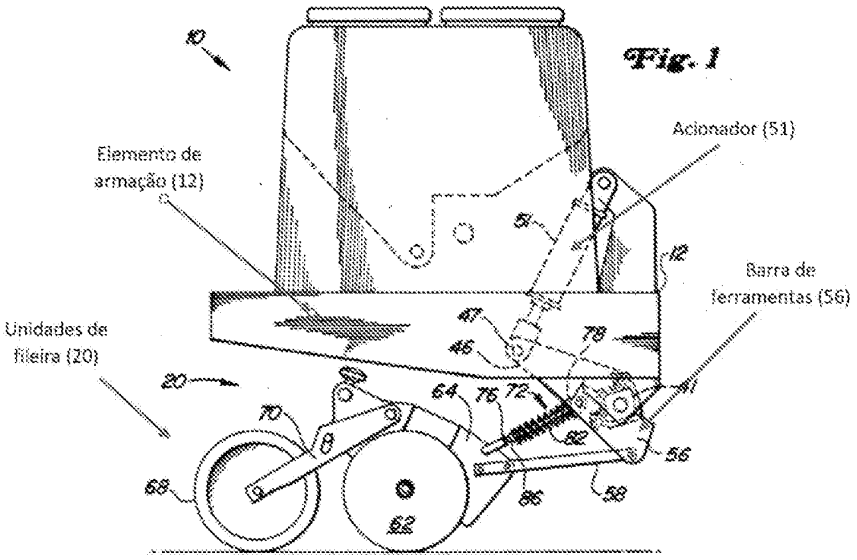
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introduced. Thus, **the invention of the present application is anticipated by the teachings document D4 in combination with D1, D2 or D3.**

Document D5 - US5065681A

50. Document **D5** describes an **agricultural implement** 10 provided with a **frame** 12 comprising a **transverse axis** 56, on which a **set of ground tools** 20 is connected. A **cylinder** 51 is also connected to the transverse axis 56 and the frame 12, making so that when the cylinder is actuated (extended or retracted), the shaft 56 moves in a to increase or decrease the pressure, respectively, of the ground tool set 20 in relation to the ground (see column 2, line 65 to column 3, line 62 of D5).



"A plurality of ground engaging tool assemblies 20 are mounted for rocking vertically with respect to the frame 12 between a lowered ground engaging position (FIG. 1) and a raised transport position."

"Connected to each of the transverse rockshafts is an engaging set of the ground tool assemblies 20. A cylinder bracket 46 (FIG. 1) is also connected to each of

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the rockshafts and extends radially therefrom to a cylinder connecting end 47 which is pivotally connected to the rod end of one of three hydraulic cylinders 51, 52 and 53 associated with the respective sections 31, 32 and 33."

"Referring to FIG. I, as the cylinder 51 is extended the rockshaft 41 is rocked in the counter-clockwise direction to move the disk 62 and press wheel 68 into contact with the ground. Once in contact with the ground, further extension of the cylinder 51 causes the spring 82 to compress and urge the assembly 20 downwardly. Therefore the downward pressure on the opener assembly 20 is dependent upon the pressure of the cylinder 51."

51. D5 proposes a solution to the same technical problem that the request under analysis seeks remedy, as described in paragraph [002] of the descriptive report of the present application, namely, keep the work tools coupled to the agricultural implement at the same soil depth, even when the implement travels over plateau terrain or gullies.

BRIEF SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide an improved down pressure arrangement for an implement. It is another object to provide such an arrangement which achieves a more constant down pressure on the ground engaging tools, even in irregular ground surface conditions. It is still another object to provide such an arrangement which is simpler and has fewer hydraulic cylinders than at least many previously available down pressure devices.

52. On the other hand, **D5** does not describe the presence of a sensor to perform the movement of the planting line, and **D5** describes that the movement is carried out by means of a pressure regulating valve and an operator control valve, in which the pressure is set via a pressure control knob.

53. In any case, a person skilled in the art in possession of the teachings of **D1, D2** or **D3** and seeking to automate the machine described by **D5,** would be motivated to add a sensor to the machine so that the planting line would better adapt to the sloping contours of the ground, thus achieving an invention similar to that described by the patent application contested herein.

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54. It remains clear that the invention described in **D5** has the **technical characteristics** described in the present patent application and solves the same technical problem presented. Thus, **the invention of the present application is anticipated by the teachings of the document D5 in combination with D1, D2 or D3.**

Document D6 - US9031749

55. Document **D6** describes a **pneumatic seeder** 10 comprising a **beam** 68, a transverse **toolbar** 78 secured by means of connections 74, 76 to the beam 68, and grooving **tools** 22a attached to tool bar 78. A pair of **hydraulic cylinders** 80, 82 is fixed between beam 68 and connections 74, 76 and is intended to actuate to raise or lower grooving tools 22a. The seeder can still comprising a **sensor** 83 for detecting when grooving tools 22a are in a lowered position (see column 4, lines 29-51 of D6).

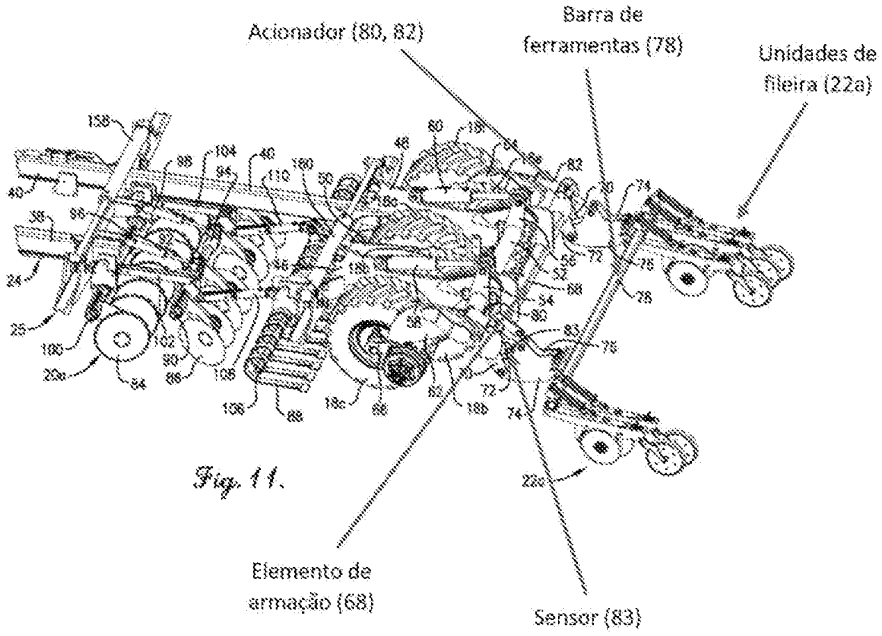


Fig. 11.

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> *"Links 74.76 are fixed joined at their rearmost ends to a transverse toolbar 78 that supports a center gang 22a of the openers 22. A pair of hydraulic cylinders 80, 82 have their rod ends connected to links 74, 76 respectively and their base ends supported on upstanding structure fixed to transverse beam 68 for raising and lowering links 74, 76. Thus, when cylinders 80, 82 are actuated, they raise or lower the center gang of openers 22a relative to center frame section 24. For convenience, cylinders 80, 82 are hereinafter referred to as the "opener cylinders". As will be seen, opener cylinders 80, 82 are also utilized to apply down pressure to openers 22a. An opener down position sensor 83 (FIG. 11) in the nature of a proximity switch is mounted between one pair of the links 74.76 and is covered and uncovered thereby for detecting when openers 22a are in their lowered position."*

56. The **D6** seeder features an **actuator** (a hydraulic cylinder), which acts to **pivot the toolbar.** On the other hand, the sensor defined by **D6** only detects the lowered positioning of the planting lines.

57. However, a technician in the subject, trying to solve the inconvenience related to keep the work tools coupled to the agricultural implement at the same depth of the ground, and using the teachings of **D1, D2** or **D3,** would be led to change the **D6** sensor so as to also check when the planting lines are not in a position predetermined.

58. It remains clear, therefore, that the invention described in **D6** has the **characteristics techniques** described in the present patent application and solves the same technical problem introduced. Thus, **the invention of the present application is anticipated by the teachings document D6 in combination with D1, D2 or D3.**

Document D7 - US2003024450A1

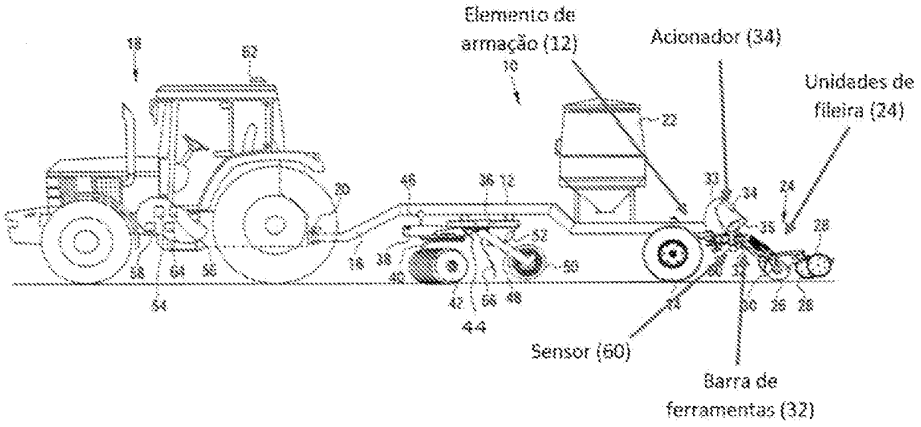
59. Document **D7** describes an **agricultural machine** provided with a **frame** 12 which a **tool holder** 32 is coupled. A plurality **of row units** 24 are

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supported by toolholder 32. **Row units can pivot, and, consequently, adjust the seeding depth,** by means of an **actuator** 34. **D7** still provides for the use of a **sensor** 60 to check the position of the actuator 34, so that the sowing depth can be regulated by a controller 54 (see paragraphs [0018] and [0023] of D7).



"[0018] A plurality of seeding units 24 are supported on the transversally extending tool carrier 32. These seeding units 24 are arranged side-by-side on the tool carrier 32. The tool carrier 32 is supported on and extends rearwardly from frame 12. The seeding units 24 are pivotally mounted to the tool carrier 32 so they can pivot about an axis parallel to the longitudinal axis of the tool carrier 32. The pivot angle of the seeding units 24, and thereby fixed the sowing depth, is fixed by seeding actuator 34 in the form of a hydraulic cylinder, extending between mount 33 on frame 12 and arm 35 coupled to seeding units 24."

"[0023] […] Information about the position of actuator 34 is supplied to controller 54 via a sensor 60, so that the sowing depth of seeders 24 can be regulated by controller 54 by means of valve device 56."

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60. Therefore, **D7** already anticipates a frame element; a docked toolbar to the frame element by means of an articulated joint; a coupled row unit to the toolbar; and a trigger, as described in the contested application.

61. However, although the sensor described by **D7** detects the positioning of the cylinder, the applicant understands that it would be obvious for a person skilled in the art to modify the configuration of such sensor, in order to detect a position of the toolbar in relation to the floor, since that, as can be seen in Figure 1 of **D7,** the sensor is coupled to the toolbar.

62. Further, a person skilled in the art in possession of the teachings of **D1, D2 ,** or **D3** would also be motivated to modify the **D7** sensor in order to achieve an invention such as the present disputed request.

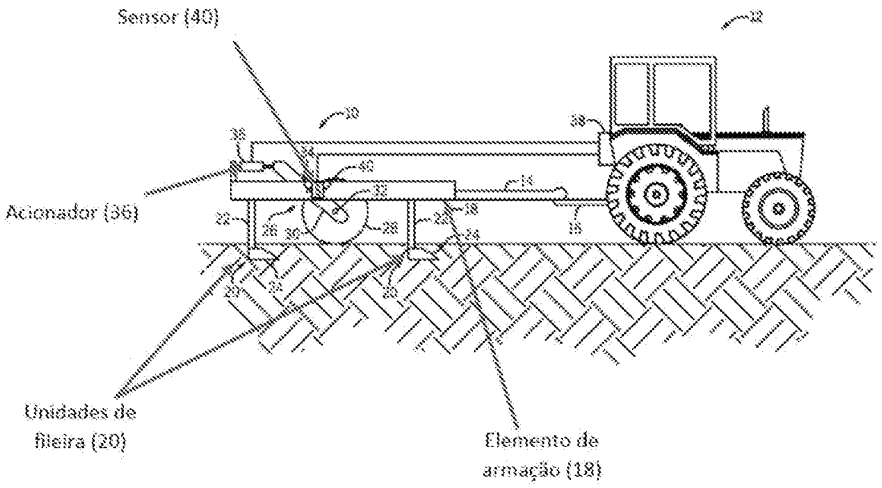
63. Therefore, it is clear that the invention described in **D7** has the **characteristics techniques** described in the present patent application and solves the same technical problem introduced. Thus, **the invention of the present application is anticipated by the teachings document D7, alone or in combination with D1, D2 or D3.**

Document D8 - US8857530B2

64. Document **D8** describes an **agricultural implement 10** that is towed by a work, such as a tractor 12, and comprising an **implement frame 18** configured to support multiple **ground engaging tools 20.** Attachment 10 further comprises a **depth control cylinder 36,** which is fluidly coupled to a tractor fluid control unit 12 and a **sensor 40** disposed on the frame 18, which is coupled to the tractor's fluid control unit 12. Sensor 40 is configured to emit signals indicating the height of the structure in relation to the ground (see column 2, lines 43-64 and column 3, lines 19-62 of D8).

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"FIG. 1 is a side view of an exemplary agricultural implement system, including an agricultural implement 10. The implement 10 is designed to be towed behind a work vehicle, such as the illustrated tractor 12. ***[...]*** *As illustrated, the tongue assembly 14 is coupled to an implement frame 18 configured to support multiple ground engaging tools 20. In the illustrated embodiment, each ground engaging tool 20 includes a shank 22 and a tillage point 24."*

"In the illustrated embodiment, the implement 10 includes a depth control cylinder 36 extending between the frame 18 and a second end of the arm 30. The depth control cylinder 36 is fluidly coupled to a fluid control unit 38 of the tow vehicle 12, and configured to rotate the arm 30 relative to the frame 18. ***[...]*** *For example, in the illustrated embodiment, the implement 10 includes a sensor 40 communicatively coupled to the fluid control unit 38, and configured to output signals indicative of the frame height. The fluid control unit 38 is configured to automatically control fluid flow to the depth control cylinder based on"*

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> *"As discussed in detail below, other embodiments may include a linear potentiometer configured to measure the position of the arm 30 relative to the frame 18, a linear potentiometer configured to measure extension of a depth control cylinder rod, or a transducer (eg, ultrasonic, electromagnetic, infrared, etc.) configured to measure the height of the frame 18 above the soil surface."*

65. Therefore, **D8** already anticipates a frame element; a unit of ranks; a trigger, and a sensor configured to detect the position of the structure in relation to the ground, such as as described in the patent application under discussion.

66. As can be seen, the sensor described by **D8** is positioned in the frame element, however, applicant understands that for one skilled in the art in possession of the teachings of **D1, D2** or **D3,** it would be obvious to modify the arrangement of such a sensor, in order to place it in the toolbar and so configure it to detect the position of the toolbar in relative to the floor, rather than the height of the frame element; thus achieving an invention similar to the present contested claim.

67. Therefore, it is clear that the invention described in **D8** has the **characteristics techniques** described in the present patent application and thus solves the same technical problem introduced. Thus, **the invention of the present application is anticipated by the teachings document D8 in combination with D1, D2 or D3.**

68. As already mentioned in this rationale, this request was required preliminary (dispatch 6.23), which took as an initial basis for the technical examination, the prior art cited during the examination of WO2018/109545 and US2020/0084951, corresponding to order BR112019010534-4. **Thus, still as a way of subsidizing the examination of the matter, the Applicant emphasizes that document D8, of this subsidy, was also pointed out during the examination of the Appeal filed by the holder AGCO against o Rejection of the corresponding application US2020/0084951. At this appeal stage, the US patent office - USPTO - maintained the rejection of the application for patent US2020/0084951, considering that the object of the claim is not endowed with activity inventiveness in the face of the above mentioned**.

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VIII - CONCLUSION

69. The Claimant points out that the Claims Framework presented in response to the requirement 6.23 does not comply with art. 32 of the LPI and Resolution No. 93/2013.

70. The Applicant also points out that independent claim 19 does not present a set of alternative characteristics to the object defined in independent claim 1; therefore, independent claim 19 is contrary to the provisions of Art. 5, II of the Instruction Regulation No. 30/2013 and item 3.24 of Resolution 124/2013.

71. The Applicant emphasizes that the **main characteristics** claimed in the request **BR112019010534-4** are included in the state of the art, when confronted with the documents **D1 to D8,** that is, the present application is neither new nor inventive compared to **D1** to **D8,** alone or in combination.

72. Furthermore, we emphasize that none of the dependent claims bring matter capable of conferring an inventive step to the object of the invention, in view of the documents here presented.

73. In view of all the above, it is clear that the present patent application for invention **does not meet the criteria for PATENTABILITY.** As discussed above, a technician in the subject seeking to solve the problem of agricultural implements having long, stiff sections that do not operate well in uneven fields with depressions or plateaus, which compromise the ability of rank units to operate properly in the field, would obtain the proposed invention, in an obvious way and without any need for experimentation, from the teachings of documents **D1 to D8.**

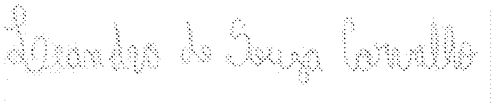
That said, the absence of legal requirements for granting the application for patent of invention BR112019010534-4.

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Machine Translated by Google

In these terms, the Applicant expects that the present invention patent application will be **DENIED ,** for be a measure of **LAW** and more legitimate **JUSTICE.**

Rio de Janeiro, August 17, 2022



LEANDRO DE SOUZA CARVALHO

CPF: 089.419.437-28

Petition 870220074436, of 08/18/2022, page 39/138

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UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/470,472	**10/10/2022 06:41:04 PM ET**	**US16/40/WO/US-2**

Title of Invention

IMPLEMENT CONTOURING TOOLBAR

Application Information

APPLICATION TYPE	Utility - U.S. National Stage under 35 USC 371	PATENT #	-
CONFIRMATION #	1653	FILED BY	Wontu Bivins
PATENT CENTER #	61050962	FILING DATE	06/17/2019
CUSTOMER #	88988	FIRST NAMED INVENTOR	Benjamin Anson Fanshier
INTL. APPLICATION #	-	INTL. FILING DATE	-
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Nathan Whitlock

Documents

TOTAL DOCUMENTS: 3

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
DE102006034798A1_withENG_TrnsltnFILED.pdf	17	Foreign Reference	614 KB
EP2335465B1_withENG_TrnsltnFILED.pdf	19	Foreign Reference	644 KB
Second Petition translation__.pdf	39	Other reference-Patent/Application/Search Documents	5384 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
DE102006034798A1_withENG_TrnsltnFILED.pdf	B82A0941524A599A7907796CCB2F6883DCCD730B37F18DCE06BEFAE219B6B5F8E6491411E8CE066BD698420118 0DA1C305F1A690F28770579A964447AACF497D
EP2335465B1_withENG_TrnsltnFILED.pdf	3BC133CB2203DF245148015FD77652291FDDD5D6C1F64D34816BEAE8CE35B58F6FC59582B7B59A4CA4765474F557D88CBE056D437AF0A2C732BCB327792507A4
Second Petition translation___.pdf	E961E7F5B3EDE269EC82344E9EECD79C05A31CCBD864D2F08020AB09F407E39A46D6C1218BBC563967DD0645EB2896487BE9C8BE6CC7D7B838EF24469ADA3D25

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors: Benjamin Anson Fanshier et al.	Confirmation No.: 1653
Applicant: AGCO Corporation	Art Unit: 3671
Application No.: 16/470,472	Examiner: LUTZ, JESSICA H
Filing Date: June 17, 2019	Atty. Docket: US16/40/WO/US-2

Title: **IMPLEMENT CONTOURING TOOLBAR**

AMENDMENT AND REPLY UNDER 37 C.F.R. § 1.111

Mail Stop Amendment
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Commissioner:

In reply to the Non-Final Office Action dated July 28, 2022, Applicant submits the following Amendment and Remarks.

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks begin on page 5 of this paper.

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (currently amended) A system, comprising:

an elongate frame member;

an elongate toolbar coupled to the frame member via a hinged joint, the toolbar oriented parallel to the frame member;

a plurality of row units coupled to the toolbar;

a first sensor configured to sense a position of the toolbar relative to ground; and

an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar relative to the frame member based on a sensed position of the toolbar, wherein the toolbar remains parallel to the frame member throughout the rotation of the toolbar.

2. (canceled)

3. (previously presented) The system of claim 1, further comprising a second sensor configured to sense an angle of the toolbar relative to the frame member.

4. (previously presented) The system of claim 3, further comprising a controller configured to receive first and second signals from the first and second sensors and cause actuation of the actuator based on the first and second signals.

5. (original) The system of claim 4, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

6. (original) The system of claim 5, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

7. (original) The system of claim 4, wherein the controller is further configured to cause adjustment of a rate of rotation based on the first signals from the first sensor.

8. (previously presented) The system of claim 1, further comprising a controller, the controller configured to receive a signal from the first sensor and cause actuation of the actuator based on the signal.

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9. (original) The system of claim 8, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

10. (original) The system of claim 9, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

11. (original) The system of claim 8, wherein the controller is further configured to cause adjustment of a rate of rotation based on the signal from the first sensor.

12. (original) The system of claim 1, wherein the sensed position is relative to a field surface, further comprising one or more electromagnetic sensors coupled to the frame member, the toolbar, or a combination of the frame member and the toolbar, the one or more electromagnetic sensors configured to sense an absolute elevation or change in elevation between the field surface and the toolbar or a combination of both the frame member and the toolbar.

13. (previously presented) The system of claim 12, further comprising a controller configured to receive one or more signals from the one or more electromagnetic sensors and cause actuation of the actuator based on the one or more signals.

14. (original) The system of claim 13, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

15. (original) The system of claim 14, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

16. (original) The system of claim 13, wherein the controller is further configured to cause adjustment of a rate of rotation based on the one or more signals from the one or more electromagnetic sensors.

17. (original) The system of claim 12, wherein the one or more electromagnetic sensors comprise ultrasonic, lidar, or radar sensors.

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18. (original) The system of claim 1, wherein the actuator is configured to rotate the toolbar throughout an obtuse angle range.

19. (currently amended) A control system for an implement comprising a frame member and a toolbar coupled to the frame member parallel to the frame member via a hinged joint such that the toolbar remains parallel to the frame member throughout the rotation of the toolbar about the hinged joint, wherein a plurality of row units are secured to the toolbar, the control system comprising:

a controller;

at least one sensor configured to sense a position of the toolbar relative to ground; and

an actuator coupled between the frame member and the toolbar, wherein the controller is configured to receive at least one signal from the at least one sensor indicating the position of the toolbar relative to the ground and cause the actuator to rotate the toolbar based on the sensed position of the toolbar.

20. (currently amended) A computer-implemented method for an implement that comprises a toolbar that has a plurality of row units secured thereto, the method for adjusting a rotation of the toolbar coupled to a frame member via a hinged joint such that the toolbar remains parallel to the frame member throughout the rotation of the toolbar based on a contour of a field on which the implement traverses, the method comprising:

at a controller:

receiving an indication of a first angle change of the toolbar relative to ground;

causing an actuator that pivotably couples the toolbar to the frame member to retract based on the indication of the first angle change;

receiving an indication of a second angle change of the toolbar relative to the ground; and

causing the actuator to extend based on the indication of the second angle change.

21. (previously presented) The system of claim 1, further comprising at least one wheel coupled to the frame member and at least partially supporting the frame member relative to the ground.

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REMARKS

The Non-Final Office Action dated July 28, 2022, has been received and reviewed. Claims 1 and 3–21 are pending in the application. Claims 1 and 3–21 stand rejected.

Claims 1, 19, and 20 are amended herein. Support for the amendments may be found in the as-filed specification at least at ¶ [0016] and FIG. 3. No new matter has been added.

Applicant respectfully requests reconsideration of the Application as amended.

Rejections under 35 U.S.C. § 102

Claims 1, 3-11, and 19-21 are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Gilstring (US 9,301,439) Applicant respectfully traverses this rejection.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)*. Gilstring does not disclose or inherently include “an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar relative to the frame member based on a sensed position of the toolbar, wherein the toolbar remains parallel to the frame member throughout the rotation of the toolbar,” as recited in amended claim 1. Therefore, there is no anticipation of the claim 1 by Gilstring.

Gilstring discloses an implement for working soil having a frame 10 with a front section and a rear section connected at a pivot and by a hydraulic cylinder 15a, as seen in FIGS. 3a-3d. The two sections are approximately collinear in the positions shown in FIGS. 3a and 3c, and angled relative to one another in the positions shown in FIGS. 3b and 3d. The sections do not “remain[] parallel” to one another “throughout the rotation of the toolbar.”

Thus Gilstring does not disclose every element of amended claim 1, and claim 1 is not anticipated by Gilstring. Claims 3-11 and 21 are not anticipated at least because they depend from claim 1.

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Similarly the 35 U.S.C. 102(a)(1) rejection of claim 19 cannot be maintained because Gilstring does not expressly or inherently disclose "A control system for an implement comprising a frame member and a toolbar coupled to the frame member parallel to the frame member via a hinged joint such that the toolbar remains parallel to the frame member throughout the rotation of the toolbar about the hinged joint, wherein a plurality of row units are secured to the toolbar."

The 35 U.S.C. 102(a)(1) rejection of claim 20 cannot be maintained because Gilstring does not expressly or inherently disclose a computer-implemented "method for adjusting a rotation of the toolbar coupled to a frame member via a hinged joint such that the toolbar remains parallel to the frame member throughout the rotation of the toolbar based on a contour of a field on which the implement traverses."

Applicant respectfully requests that the rejection of claims 1, 3-11, and 19-21 be withdrawn.

Rejections under 35 U.S.C. § 103

Claims 12-17 are rejected under 35 U.S.C. 103 as being unpatentable over Gilstring in view of Henry (US 8,857,530) Applicant respectfully traverses this rejection.

The 35 U.S.C. 103 rejection of claims 12-17 cannot be maintained because Gilstring in view of Henry does not teach or suggest "an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar relative to the frame member based on a sensed position of the toolbar, wherein the toolbar remains parallel to the frame member throughout the rotation of the toolbar," as recited in amended claim 1, from which these claims depend.

The teachings of Gilstring are summarized above in the discussion of 35 U.S.C. 102. In particular, the front and rear sections of the frame 10 of Gilstring do not "remain[] parallel" to one another "throughout the rotation of the toolbar."

The Office relies on Henry as teaching various electromagnetic sensors. *Office Action*, pp. 6-7. However, Henry does not teach or suggest that a "toolbar remains parallel to the frame member throughout the rotation of the toolbar." Thus, Henry does not cure the deficiency of Gilstring with respect to claim 1.

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Claim 1 is therefore nonobvious over Gilstring in view of Henry. Claims 12-17 are each nonobvious at least because they each depend from claim 1. Applicant respectfully requests that the rejection of claims 12-17 be withdrawn.

Claims 1 and 18 are rejected under 35 U.S.C. 103 as being unpatentable over Friesen et al. (US 2014/0069670) in view of Reiber et al. (US 6,112827). Applicant respectfully traverses this rejection.

The 35 U.S.C. 103 rejection of claims 1 and 18 cannot be maintained because Friesen in view of Reiber does not teach or suggest “an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar relative to the frame member based on a sensed position of the toolbar, wherein the toolbar remains parallel to the frame member throughout the rotation of the toolbar,” as recited in amended claim 1.

Friesen teaches a hitch frame 13 connected to a frame 21 of ground engaging tools, which can pivot about axes TA and/or HA. *See Friesen*, FIGS. 1-3. The frame 21 does not “remain[] parallel to" the hitch frame 13 “throughout the rotation of the" frame 21.

The Office relies in Reiber as teaching a similar system with sensors. *Office Action*, p. 8. However, Reiber also does not teach or suggest that “the toolbar remains parallel to the frame member throughout the rotation of the toolbar.”

Thus, the combination of Friesen and Reiber does not teach or suggest every element of claim 1, and claim 1 is nonobvious over the references. Claim 18 is nonobvious at least because it depends from claim 1.

Applicant respectfully requests that the rejection of claims 1 and 18 be withdrawn.

CONCLUSION

The amendments above should be entered by the Office because the amendments are supported by the as-filed disclosure and do not add new matter to the application.

No additional fees are believed due, but the Commissioner is hereby authorized to charge any additional fees which may be required, or to credit any overpayment, to Deposit Account No. 010442.

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Claims 1 and 3–21 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain that might be resolved by a telephone conference, the Examiner is respectfully invited to contact Applicant's undersigned attorney.

Respectfully submitted,

/draft/

Nathan E. Whitlock
Reg. No.: 65,744
AGCO Corporation
Patent Department
420 W Lincoln Blvd
Hesston, KS 67062
Phone: (620) 327-6993

Date: _____

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
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Electronic Acknowledgement Receipt

EFS ID:	46811489
Application Number:	16470472
International Application Number:	
Confirmation Number:	1653
Title of Invention:	IMPLEMENT CONTOURING TOOLBAR
First Named Inventor/Applicant Name:	Benjamin Anson Fanshier
Customer Number:	88988
Filer:	Nathan E. Whitlock/Wontu Bivins
Filer Authorized By:	Nathan E. Whitlock
Attorney Docket Number:	US1640/WO-US
Receipt Date:	13-OCT-2022
Filing Date:	17-JUN-2019
Time Stamp:	12:55:31
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		US1640WOUS-2_OA_response.pdf	140694 bd59866f59c8b98fadc48e68662422591 7f45778	yes	8

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Request for Reconsideration-After Non-Final Rejection	1	1
	Claims	2	4
	Applicant Arguments/Remarks Made in an Amendment	5	8
Warnings:			
Information:			
	Total Files Size (in bytes):	140694	

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New Applications Under 35 U.S.C. 111

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National Stage of an International Application under 35 U.S.C. 371

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New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/470,472	Filing Date 06/17/2019	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

	(Column 1)	(Column 2)			
FOR	NUMBER FILED	NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	10/13/2022	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/CRYSTAL QUEEN/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/470,472	Filing Date 06/17/2019	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

	(Column 1)	(Column 2)			
FOR	NUMBER FILED	NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

AMENDMENT		(Column 1)		(Column 2)	(Column 3)			
		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
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	Independent (37 CFR 1.16(h))	* 1	Minus	*** 3	= 0		x $0 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

AMENDMENT		(Column 1)		(Column 2)	(Column 3)			
		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/CRYSTAL QUEEN/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/470,472	06/17/2019	Benjamin Anson Fanshier	US1640/WO-US	1653

88988 7590 01/31/2023

AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston, KS 67062

EXAMINER
LUTZ, JESSICA H

ART UNIT	PAPER NUMBER
3671	

NOTIFICATION DATE	DELIVERY MODE
01/31/2023	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patents@agcocorp.com

Office Action Summary	Application No. 16/470,472	Applicant(s) Fanshier et al.	
	Examiner JESSICA H LUTZ	Art Unit 3671	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 10/13/22.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☑ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1 and 3-21 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1,3-17 and 19-21 is/are rejected.

8) ☑ Claim(s) 18 is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Claim Rejections - 35 USC § 102

2. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention.

4. Claim(s) 1, 8, 9, 10, 19, 21 is/are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Hublaek et al. (US 9,031,759).

Regarding claim 1, Habalek teaches a system, comprising: an elongate frame member (152); an elongate toolbar (toolbar of 22) coupled to the frame member via a hinged joint (fig. 8, connection between beam 152 and opener assembly), the toolbar oriented parallel to the frame member (fig. 8); a plurality of row units coupled to the toolbar (22a-c); a first sensor (83) configured to sense a position of the toolbar relative to ground; and an actuator (80,82,172) coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar relative to the frame member based on a sensed position of the toolbar (12: 20-44),

wherein the toolbar remains parallel to the frame member throughout the rotation of the toolbar (fig. 8).

8. The system of claim 1, further comprising a controller (274), the controller configured to receive a signal from the first sensor and cause actuation of the actuator based on the signal.

9. The system of claim 8, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component (178).

10. The system of claim 9, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component (178).

19. A control system for an implement comprising a frame member and a toolbar (toolbar of 22) coupled to the frame member (152) parallel to the frame member via a hinged joint (fig. 8, hinge) such that the toolbar remains parallel to the frame member throughout the rotation of the toolbar about the hinged joint, wherein a plurality of row units are secured to the toolbar, the control system comprising: a controller (274); at least one sensor (83) configured to sense a position of the toolbar relative to ground; and an actuator (80,82,172) coupled between the frame member and the toolbar, wherein the controller is configured to receive at least one signal from the at least one sensor indicating the position of the toolbar relative to the ground and cause the actuator to rotate the toolbar based on the sensed position of the toolbar (12: 20-44).

21. The system of claim 1, further comprising at least one wheel coupled to the frame member and at least partially supporting the frame member relative to the ground (18).

5. Claim(s) 1, 3-11, 20 is/are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Houk (US 2015/0230391).

Regarding claim 1, Houk teaches a system, comprising: an elongate frame member (34); an elongate toolbar (Image 1 below) coupled to the frame member via a hinged joint (64), the toolbar oriented parallel to the frame member (Fig. 2c); a plurality of row units coupled to the toolbar (fig. 1); a first sensor (114) configured to sense a position of the toolbar relative to ground; and an actuator (102) coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar relative to the frame member based on a sensed position of the toolbar (control system 38), wherein the toolbar remains parallel to the frame member throughout the rotation of the toolbar (fig. 2c).

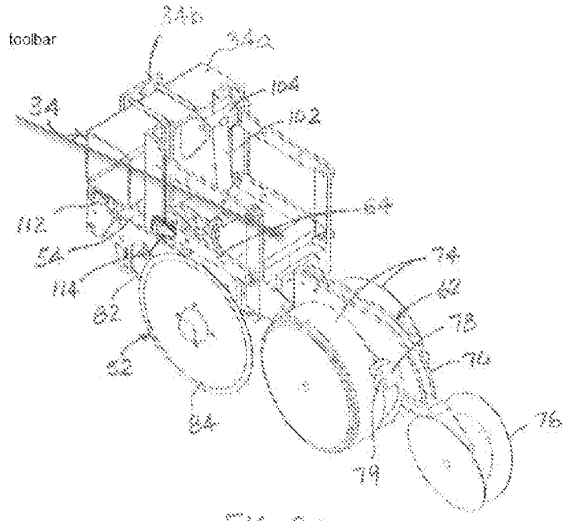


FIG. 2C

Image 1: annotated drawing taken from Houk

3. The system of claim 1, further comprising a second sensor configured to sense an angle of the toolbar relative to the frame member (112).

4. The system of claim 3, further comprising a controller configured to receive first and second signals from the first and second sensors and cause actuation of the actuator based on the first and second signals [0036-0037].

5. The system of claim 4, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component [0036 valve].

6. The system of claim 5, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component [0036 valve].

7. The system of claim 4, wherein the controller is further configured to cause adjustment of a rate of rotation based on the first signals from the first sensor [0036] (begins actuation).

8. The system of claim 1, further comprising a controller (122), the controller configured to receive a signal from the first sensor and cause actuation of the actuator based on the signal [0036-0037].

9. The system of claim 8, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component [0036-0037].

10. The system of claim 9, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component [0036 valve].

11. The system of claim 8, wherein the controller is further configured to cause adjustment of a rate of rotation based on the signal from the first sensor [0036 valve].

20. A computer-implemented method for an implement that comprises a toolbar that has a plurality of row units secured thereto, the method for adjusting a rotation of the toolbar (Image 1) coupled to a frame member (34) via a hinged joint (64) such that the toolbar remains parallel to the frame member throughout the rotation of the toolbar (fig. 2c) based on a contour of a field on which the implement traverses, the method comprising: at a controller (122): receiving an indication of a first angle change (114) of the toolbar relative to ground; causing an actuator (102) that pivotably couples the toolbar to the frame member to retract based on the indication of the first angle change; receiving an indication of a second angle change (112) of the toolbar relative to the ground; and causing the actuator to extend based on the indication of the second angle change.

Claim Rejections - 35 USC § 103

6. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

7. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim(s) 12-17 is/are rejected under 35 U.S.C. 103 as being unpatentable over Houk in view of Henry (US 8,857,530).

Regarding claim 12, Houk teaches the system of claim 1, but fails to teach wherein the sensed position is relative to a field surface, further comprising one or more electromagnetic sensors coupled to the frame member, the toolbar, or a combination of the frame member and the toolbar, the one or more electromagnetic sensors configured to sense an absolute elevation or change in elevation between the field surface and the toolbar or a combination of both the frame member and the toolbar. However, Henry teaches a similar system with an electromagnetic sensor on a frame to measure the distance to the soil surface (3:49-62). It would have been obvious to one with ordinary skill in the art, before the effective filing date of the claimed invention, to include an electromagnetic sensor on the frame of Houk as an addition of parts that allows for the distance to the ground to be measured and therefore allow for substantially constant penetration depth of the tools as taught beneficial by Henry (4:10-15).

13. The system of claim 12, further comprising a controller configured to receive one or more signals from the one or more electromagnetic sensors and cause actuation of the actuator based on the one or more signals (126).

14. The system of claim 13, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component [0036 valve].

15. The system of claim 14, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component [0036 valve].

16. The system of claim 13, wherein the controller is further configured to cause adjustment of a rate of rotation based on the one or more signals from the one or more electromagnetic sensors (as modified).

17. (original) The system of claim 12, wherein the one or more electromagnetic sensors comprise ultrasonic, lidar, or radar sensors (as modified).

Allowable Subject Matter

9. Claim 18 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

10. Applicant's amendments with respect to the claim(s) have been considered but are moot because the new ground of rejection does not rely on any reference applied in the prior rejection of record for any teaching or matter specifically challenged in the argument.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing

date of the advisory action. In no event, however, will the statutory period for reply expire later than

SIX MONTHS from the date of this final action.

/JESSICA H LUTZ/
Primary Examiner, Art Unit 3671

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/470,472	Fanshier et al.
	Examiner	Art Unit
	JESSICA H LUTZ	3671

CPC - Searched*		
Symbol	Date	Examiner
a01b 63/114,102,1112,28, 045, 008, 10	06/19/2021	jl
a01b 49/00,027	07/12/2022	jl

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
EAST text (see attached)	06/19/2021	jl
inventor name search	06/19/2021	jl
Updated search	07/13/2022	jl
Updated search	01/26/2023	jl

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/JESSICA H LUTZ/ Primary Examiner, Art Unit 3671	

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PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	26	((("FANSHIER") near3 ("Benjamin")) OR (("SCHERTZ") near3 ("Rex"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	OFF	OFF	2021/06/18 10:07 AM
L2	15	("20020017090"|"20020017389"|"20080308020"|"20110120357"|"20110284252"|"20110315410"|"20120298388"|"20140069670"|"20140196996"|"20150156955"|"20150230391"|"4825958"|"5511623"|"6076611"|"6112827").PN.	(US-PGPUB; USPAT)	OR	OFF	OFF	2021/06/18 10:09 AM
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L4	7	sauder.inv. and depth near sensing	(US-PGPUB; USPAT)	OR	OFF	OFF	2021/06/18 07:52 PM
L5	1078	(ground soil) with sens$3 with angle and (down near pressure actuator) and (frame tool toolbar)	(US-PGPUB; USPAT)	OR	OFF	OFF	2021/06/18 07:56 PM
L6	1418	(ground soil) with sens$3 with angle and (down near pressure actuator) and (frame tool toolbar)	(US-PGPUB; USPAT)	OR	ON	ON	2021/06/18 07:56 PM
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		"4506609" | "5479992" | "5499683" | "5590721" | "5640914" | "5653292" | "6085846" | "6971452" | "8201637" | "8235130" | "8448717" | "8534373" | "8573319" | "8577561" | "8601961" | "8657023" | "8857530" | "9232687").PN. OR ("9554504").URPN.					
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L14	18	("20020017090" | "20020017389" | "20080093093" | "20080308020" | "20110120357" | "20110284252" | "20110315410" | "20120298388" | "20140069670" | "20140196996" | "20150156955" | "20150230391" | "4825958" | "5511623" | "6076611" | "6112827" | "8567517" | "8657026").PN. OR ("10506756").URPN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2021/06/18 08:34 PM
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		$).did. or (US-6076611-$ or US-10561052-$ or US-10939604-$ or US-8857530-$ or US-8573319-$ or US-5653292-$ or US-5499683-$ or US-5479992-$ or US-10506756-$ or US-9930823-$ or US-9253937-$ or US-6378619-$).did.					
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		US-20180295769-A1 OR US-20160134844-A1 OR DE-102017121152-A1 OR US-20140041563-A1 OR WO-2019010239-A1).did. AND DWPI.dbnm.) OR ((KR-102302749-B1 OR KR-20140104720-A).did. AND FTDB.dbnm.) OR ((KR-101423669-B1 OR DE-102009044898-A1).did. AND FPRS.dbnm.)					
L30	25	L28 AND sens$3	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2022/07/16 03:42 PM
L31	152	((US-20200084951-A1 OR US-20150230391-A1 OR US-20150156955-A1 OR US-20140196996-A1 OR US-20140069670-A1 OR US-20120298388-A1 OR US-20110315410-A1 OR US-20110284252-A1 OR US-20110120357-A1 OR US-20080308020-A1 OR US-20020017389-A1 OR US-20020017090-A1 OR US-20150289438-A1 OR US-20210051837-A1 OR US-20200344937-A1 OR US-20200100421-A1 OR US-20180014450-A1 OR US-20170006761-A1 OR US-20170006758-A1 OR US-20210037695-A1 OR US-20190373801-A1 OR US-20190021211-A1 OR US-20130112124-A1 OR US-20130112123-A1 OR US-20210095438-A1 OR US-20190075710-	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 06:13 PM

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		A1 OR US-20200404837-A1 OR US-20200404830-A1 OR US-20200383260-A1 OR US-20200359562-A1 OR US-20200359559-A1 OR US-20140060862-A1 OR US-20140048296-A1 OR US-20130192186-A1 OR US-20130032363-A1 OR US-20120060731-A1 OR US-20090301743-A1 OR US-20100025056-A1 OR US-20080093093-A1 OR US-20200068783-A1 OR US-20190110392-A1 OR US-20190110391-A1 OR US-20190110388-A1 OR US-20200093052-A1 OR US-20200344939-A1 OR US-20210298215-A1 OR US-20200236873-A1 OR US-20130062083-A1 OR US-20200146201-A1 OR US-20220132720-A1 OR US-20210298217-A1 OR US-20170339819-A1 OR US-20180070523-A1).did. AND PGPB.dbnm.) OR ((US-6112827-A OR US-6076611-A OR US-5511623-A OR US-4825958-A OR US-10123475-B2 OR US-9554504-B2 OR US-10561052-B2 OR US-10939604-B2 OR US-10838432-B2 OR US-10701854-B2 OR US-9232687-B2 OR US-8857530-B2 OR US-8657023-B2 OR US-8577561-B2 OR US-8573319-B1 OR US-5653292-A OR US-5640914-A OR US-5590721-A OR US-5499683-A OR US-5479992-A OR US-					

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
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		4444271-A OR US-4353423-A OR US-5794421-A OR US-5065681-A OR US-4300638-A OR US-2622499-A OR US-8567517-B2 OR US-10537052-B2 OR US-10506756-B2 OR US-8657026-B2 OR US-10368471-B2 OR US-10342171-B2 OR US-10299423-B2 OR US-10021822-B2 OR US-9930823-B2 OR US-9253937-B2 OR US-9198341-B2 OR US-6378619-B2 OR US-4763915-A OR US-10813264-B2 OR US-10925203-B2 OR US-11382258-B1 OR US-1347992-A OR US-9301439-B2 OR US-2081346-A OR US-6263977-B1 OR US-10412873-B2 OR US-10405476-B2 OR US-10368474-B2 OR US-11234354-B2 OR US-11197408-B2 OR US-10645857-B2 OR US-4519460-A OR US-7921931-B2 OR US-9686899-B2 OR US-9635797-B2 OR US-11191204-B2 OR US-10492353-B2 OR US-10813265-B2 OR US-9615500-B2 OR US-10820470-B2 OR US-10820471-B2 OR US-10959367-B2 OR US-10602653-B2 OR US-10412875-B2 OR US-10624253-B2 OR US-10750653-B2 OR US-10827665-B2 OR US-11019762-B2 OR US-11140805-B2 OR US-11206753-B2).did. AND USPT.dbnm.) OR ((DE-102009044898-A1 OR DE-102016220489-A1 OR DE-822734-C OR DE-841068-C OR FR-2632484-A1 OR FR-660688-A OR KR-					

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
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		101342396-B1 OR KR-101423669-B1).did. AND FPRS.dbnm.) OR ((DE-102017121152-A1 OR EP-3501248-A1 OR FI-96912-B OR US-20140041563-A1 OR US-20150012189-A1 OR US-20150053439-A1 OR US-20160134844-A1 OR US-20180070523-A1 OR US-20180116095-A1 OR US-20180295769-A1 OR US-20190021211-A1 OR US-20190150350-A1 OR US-5653292-A OR US-5709271-A OR WO-2012125109-A1 OR WO-2019010239-A1).did. AND DWPI.dbnm.) OR ((KR-102166055-B1 OR KR-102302749-B1 OR KR-200315786-Y1 OR KR-20140104720-A).did. AND FTDB.dbnm.)					
L32	17	L31 AND electromagnetic	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 06:14 PM
L33	18	("4825958" | "5511623" | "6076611" | "6112827" | "8567517" | "8657026" | "20020017090" | "20020017389" | "20080093093" | "20080308020" | "20110120357" | "20110284252" | "20110315410" | "20120298388" | "20140069670" | "20140196996" | "20150156955" | "20150230391").pn. OR ("10506756").urpn. AND (PGPB | USPT | USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/18 06:18 PM
L35	5	L31 AND rate WITH rotation	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD,	OR	ON	ON	2022/07/18 06:31 PM

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			DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L36	6	L31 AND speed WITH rotation	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 06:32 PM
L37	4	L31 AND (rate speed) WITH actuation	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 06:33 PM
L38	0	L33 AND (rate speed) WITH actuation	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 06:34 PM
L39	1	L33 AND (rate speed) WITH (rotation actuation)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 06:34 PM
L40	297	L26 AND (rate speed) WITH (rotation actuation)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 09:12 PM
L41	4	L33 AND sensor	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/18 11:13 PM
L42	3	("20030024450"|"5065681"|"9031749").PN.	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/10 12:23 PM
L43	3	("20030024450" OR "5065681" OR "9031749").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/23 02:40 PM
L44	5	("9301439" "5065681" "9031749" "8857530"	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/23 02:42 PM

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		"6112827").pn.					
L46	2	("20150230391"|"20030024450").PN.	(US-PGPUB; USPAT)	OR	OFF	OFF	2023/01/23 02:44 PM
L47	1	("8573319").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/24 04:39 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16470472
Filing Date	2019-06-17
First Named Inventor	Fanshier, Benjamin Anson
Art Unit	3671
Examiner Name	Lutz, Jessica H.
Attorney Docket Number	US1640/WO-US

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5065681	A	1991-11-19	HADLEY	
	2	9031749	B2	2015-05-12	HUBALEK	

If you wish to add additional U.S. Patent citation information please click the Add button. Add

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20030024450	A1	2003-02-06	JUPTNER	

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	102006034798	DE	B4	2014-02-13	POETTINGER OHG ALOIS		X
	2	2335465	EP	B1	2012-05-23	AMAZONEN WERKE DREYER H		☒

EFS Web 2.1.18

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.H.L/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16470472
	Filing Date	2019-06-17
	First Named Inventor	Fanshier, Benjamin Anson
	Art Unit	3671
	Examiner Name	Lutz, Jessica H.
	Attorney Docket Number	US1640/WO-US

If you wish to add additional Foreign Patent Document citation information please click the Add button [Add]

NON-PATENT LITERATURE DOCUMENTS [Remove]

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	INPI, Notice of 3rd Party Petition submitted for related Brazilian Patent Application No. BR112019010534-4, dated 18 AUG 2022, 39 pages.	X

If you wish to add additional non-patent literature document citation information please click the Add button [Add]

EXAMINER SIGNATURE

Examiner Signature	/JESSICA H LUTZ/	Date Considered	01/23/2023

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.H.L/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16470472
	Filing Date	2019-06-17
	First Named Inventor	Fanshier, Benjamin Anson
	Art Unit	3671
	Examiner Name	Lutz, Jessica H.
	Attorney Docket Number	US1640/WO-US

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Nathan E. Whitlock/	Date (YYYY-MM-DD)	2022-10-10
Name/Print	Nathan E. Whitlock	Registration Number	65,744

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.H.L/

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.H.L/

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
AGCO - Exhibit No. 2005
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Doc Code: A.NE.AFCP
Document Description: After Final Consideration Pilot Program Request

PTO/SB/434 (05-13)

CERTIFICATION AND REQUEST FOR CONSIDERATION UNDER THE AFTER FINAL CONSIDERATION PILOT PROGRAM 2.0

Practitioner Docket No.:	Application No.:	Filing Date:
US1640/WO-US	16/470,472	June 17, 2019
First Named Inventor:	**Title:**	
Fanshier	Implement Contouring Toolbar	

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS CONSIDERATION UNDER THE AFTER FINAL CONSIDERATION PILOT PROGRAM 2.0 (AFCP 2.0) OF THE ACCOMPANYING RESPONSE UNDER 37 CFR 1.116.

1. The above-identified application is (i) an original utility, plant, or design nonprovisional application filed under 35 U.S.C. 111(a) [a continuing application (*e.g.*, a continuation or divisional application) is filed under 35 U.S.C. 111(a) and is eligible under (i)], or (ii) an international application that has entered the national stage in compliance with 35 U.S.C. 371(c).
2. The above-identified application contains an outstanding final rejection.
3. Submitted herewith is a response under 37 CFR 1.116 to the outstanding final rejection. The response includes an amendment to at least one independent claim, and the amendment does not broaden the scope of the independent claim in any aspect.
4. This certification and request for consideration under AFCP 2.0 is the only AFCP 2.0 certification and request filed in response to the outstanding final rejection.
5. Applicant is willing and available to participate in any interview requested by the examiner concerning the present response.
6. This certification and request is being filed electronically using the Office's electronic filing system (EFS-Web).
7. Any fees that would be necessary consistent with current practice concerning responses after final rejection under 37 CFR 1.116, *e.g.*, extension of time fees, are being concurrently filed herewith. [There is no additional fee required to request consideration under AFCP 2.0.]
8. By filing this certification and request, applicant acknowledges the following:

- Reissue applications and reexamination proceedings are not eligible to participate in AFCP 2.0.
- The examiner will verify that the AFCP 2.0 submission is compliant, *i.e.*, that the requirements of the program have been met (see items 1 to 7 above). For compliant submissions:
  - The examiner will review the response under 37 CFR 1.116 to determine if additional search and/or consideration (i) is necessitated by the amendment and (ii) could be completed within the time allotted under AFCP 2.0. If additional search and/or consideration is required but cannot be completed within the allotted time, the examiner will process the submission consistent with current practice concerning responses after final rejection under 37 CFR 1.116, *e.g.*, by mailing an advisory action.
  - If the examiner determines that the amendment does not necessitate additional search and/or consideration, or if the examiner determines that additional search and/or consideration is required and could be completed within the allotted time, then the examiner will consider whether the amendment places the application in condition for allowance (after completing the additional search and/or consideration, if required). If the examiner determines that the amendment does not place the application in condition for allowance, then the examiner will contact the applicant and request an interview.
    - The interview will be conducted by the examiner, and if the examiner does not have negotiation authority, a primary examiner and/or supervisory patent examiner will also participate.
    - If the applicant declines the interview, or if the interview cannot be scheduled within ten (10) calendar days from the date that the examiner first contacts the applicant, then the examiner will proceed consistent with current practice concerning responses after final rejection under 37 CFR 1.116.

Signature	Date
/Nathan E. Whitlock/	February 17, 2023
Name (Print/Typed) Nathan E. Whitlock	**Practitioner Registration No.** 65744

***Note**: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.*

☐ * Total of _____ forms are submitted.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors: Fanshier, Benjamin Anson et al.	Confirmation No.: 1653
Applicant: AGCO Corporation	Art Unit: 3671
Application No.: 16/470,472	Examiner: LUTZ, JESSICA H
Filing Date: June 17, 2019	Atty. Docket: US1640/WO-US

Title: **IMPLEMENT CONTOURING TOOLBAR**

AMENDMENT & RESPONSE TO FINAL OFFICE ACTION UNDER 37 C.F.R. § 1.116

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Commissioner for Patents
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Alexandria, VA 22313-1450

Commissioner:

In reply to the Final Office Action dated January 31, 2023, Applicant submits the following Amendment and Remarks.

Proposed Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks begin on page 6 of this paper.

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (Currently Amended) A system, comprising:

an elongate frame member;

an elongate toolbar coupled to the frame member via a hinged joint, the toolbar oriented parallel to the frame member;

a plurality of row units coupled to the toolbar;

a first sensor configured to sense a position of the toolbar relative to ground;

a second sensor configured to sense an angle of the toolbar relative to the frame member; and

an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar relative to the frame member based on a sensed position of the toolbar, wherein the toolbar remains parallel to the frame member throughout the rotation of the toolbar.

2. (Canceled)

3. (Canceled)

4. (Currently Amended) The system of ~~claim 3~~ claim 1 further comprising a controller configured to receive first and second signals from the first and second sensors and cause actuation of the actuator based on the first and second signals.

5. (Original) The system of claim 4, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

6. (Original) The system of claim 5, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

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7. (Original) The system of claim 4, wherein the controller is further configured to cause adjustment of a rate of rotation based on the first signals from the first sensor.

8. (Previously Presented) The system of claim 1, further comprising a controller, the controller configured to receive a signal from the first sensor and cause actuation of the actuator based on the signal.

9. (Original) The system of claim 8, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

10. (Original) The system of claim 9, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

11. (Original) The system of claim 8, wherein the controller is further configured to cause adjustment of a rate of rotation based on the signal from the first sensor.

12. (Original) The system of claim 1, wherein the sensed position is relative to a field surface, further comprising one or more electromagnetic sensors coupled to the frame member, the toolbar, or a combination of the frame member and the toolbar, the one or more electromagnetic sensors configured to sense an absolute elevation or change in elevation between the field surface and the toolbar or a combination of both the frame member and the toolbar.

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13. (Previously Presented) The system of claim 12, further comprising a controller configured to receive one or more signals from the one or more electromagnetic sensors and cause actuation of the actuator based on the one or more signals.

14. (Original) The system of claim 13, further comprising a control component that actuates the actuator, wherein the controller is configured to cause actuation by sending a signal to the control component.

15. (Original) The system of claim 14, wherein the control component comprises a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component.

16. (Original) The system of claim 13, wherein the controller is further configured to cause adjustment of a rate of rotation based on the one or more signals from the one or more electromagnetic sensors.

17. (Original) The system of claim 12, wherein the one or more electromagnetic sensors comprise ultrasonic, lidar, or radar sensors.

18. (Original) The system of claim 1, wherein the actuator is configured to rotate the toolbar throughout an obtuse angle range.

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19. (Currently Amended) A control system for an implement comprising a frame member and a toolbar coupled to the frame member parallel to the frame member via a hinged joint such that the toolbar remains parallel to the frame member throughout the rotation of the toolbar about the hinged joint, wherein a plurality of row units are secured to the toolbar, the control system comprising:

a controller;

~~at least one~~ a first sensor configured to sense a position of the toolbar relative to ground;

a second sensor configured to sense an angle of the toolbar relative to the frame member; and

an actuator coupled between the frame member and the toolbar, wherein the controller is configured to receive at least one signal from the at least one sensor indicating the position of the toolbar relative to the ground and cause the actuator to rotate the toolbar based on the sensed position of the toolbar.

20. (Canceled)

21. (Previously Presented) The system of claim 1, further comprising at least one wheel coupled to the frame member and at least partially supporting the frame member relative to the ground.

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REMARKS

The Final Office Action dated January 31, 2023, has been received and reviewed. Claims 1 and 3–21 are pending in the application. Claims 1, 3–17, and 19–21 stand rejected. Claim 18 is objected to.

Applicant proposes to amend claims 1, 4, and 19, and to cancel claims 3 and 20. Claim 1 is proposed to be amended to incorporate the subject matter of claim 3. Claim 4 is proposed to be amended to update claim dependency due to the cancelation of claim 3. Claim 19 is proposed to be amended in a similar manner as claim 1. No new matter is proposed to be added.

The proposed amendments should be entered because they present rejected claims in better form consideration on appeal. Amendments were not submitted earlier because Applicant believed that the prior amendments placed the claims in condition for allowance, for the reasons set forth in the prior responses.

Applicant respectfully requests reconsideration of the Application as proposed to be amended.

After-Final Consideration Pilot 2.0 Request

Applicant submits herewith an After-Final Consideration Pilot (AFCP) Program Request (Form PTO/SB/434). Applicant submits that all criteria for the AFCP are met by the present amendment, including the requirement that at least one independent claim be amended in a manner that does not broaden the scope of the claim in any respect. Applicant is willing and able to participate in an interview initiated by the Examiner concerning this amendment. Thus, Applicant requests that the Examiner consider the amendment under the AFCP 2.0 program.

Interview Summary

Applicant would like to thank Examiner Lutz for the courtesy extended during a telephone interview on February 17, 2023 with Applicant's undersigned representative. In accordance with M.P.E.P. § 713.04, Applicant submits the following details of the interview:

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(A) A brief description of the nature of any exhibit shown or any demonstration conducted: N/A

(B) Identification of the claims discussed: Pending claims 1, 3, 19, and 20.

(C) Identification of specific prior art discussed: Hubalek et al. (US 9,031,749) and Houck (US 2015/0230391).

(D) Identification of the principal proposed amendments of a substantive nature discussed: Proposed amendments included incorporating the element of claim 3 into claim 1 and into claim 19, and canceling claim 20.

(E) The general thrust of the principal arguments of the applicant and the examiner: The rejections made in the Office Action of July 19, 2013, were discussed. The parties discussed the movement of the row unit in Houck and the frame in Hubalek.

(F) A general indication of any other pertinent matters discussed: N/A

(G) If appropriate, the general results or outcome of the interview: Applicant agreed to submit amendments and remarks formalizing Applicant's position. Examiner agreed that the proposed amendments appear to overcome the rejections in the Final Office Action.

(H) In the case of an interview via electronic mail, a paper copy of the Internet e-mail contents MUST be made and placed in the patent application file: N/A

If the Office believes that further comments are necessary or desired describing the interview, the Examiner is kindly requested to contact Applicant's undersigned attorney, and further detail will be promptly provided to the extent possible.

Rejections under 35 U.S.C. § 102

Hubalek

Claim(s) 1, 8, 9, 10, 19, 21 are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Hubalek et al. (US 9,031,749). Applicant respectfully traverses this rejection.

Applicant proposes to amend claim 1 to recite the subject matter previously presented in claim 3. The Final Office Action did not reject claim 3 based on Hubalek.

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Claim 1, as proposed to be amended, is not anticipated by Hubalek. Claims 8, 9, 10, and 21 are not anticipated at least because they depend from claim 1.

Applicant proposes similar amendments to claim 19, and therefore, claim is also not anticipated.

Applicant respectfully requests that the rejection based on Hubalek be withdrawn.

Houck

Claim(s) 1, 3-11, 20 are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Houck (US 2015/0230391). Applicant respectfully traverses this rejection.

Houck teaches a planting system having seeding row assemblies 36 coupled to a frame 34. *Houck*, ¶ [0027]. The system has two different row units for each row: a tillage row unit 52, and a seeding row unit 62. *Houck*, ¶¶ [0028]-[0029]. Each is coupled to the implement frame 34 by a parallel linkage 54, 64. The parallel linkages 54, 64, maintain the row units 52, 62 at the same orientation relative to the frame 34 (i.e., they revolve relative to the frame 34). The Final Office Action refers to the part indicated below as corresponding to the elongate toolbar recited in claim 1, *i.e.*, the part to which the parallel linkage 64 is attached. This part appears to be rigidly connected to the row unit frame 70.

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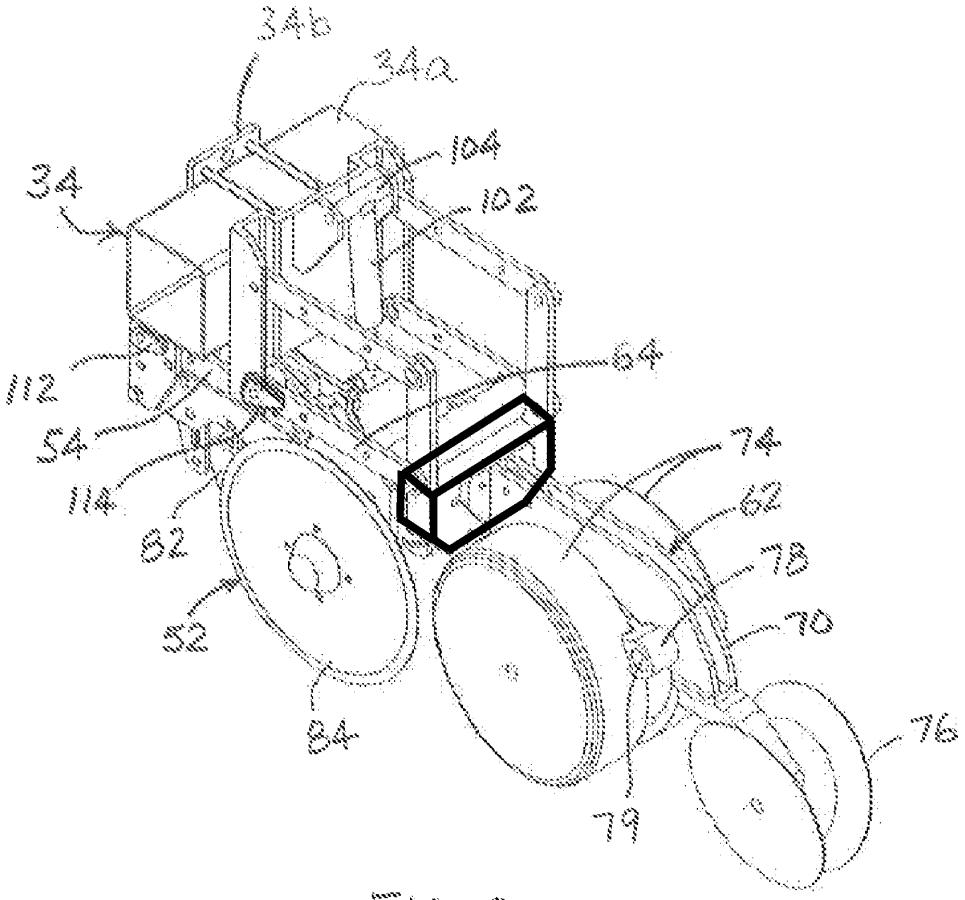


FIG. 2C

This part cannot be the elongate toolbar of claim 1 because it has only one row unit; it does not have "a plurality of row units coupled to" it. Even this part of the row unit 62 could be considered an elongate toolbar, it is not "configured to rotate . . . relative to the frame member." The parallel linkage 64 maintains the orientation of that part (and hence, the row unit frame 70) relative to the implement frame 34.

Thus, claim 1, as proposed to be amended, is not anticipated by Houck. Claims 4-11 are not anticipated at least because they depend from claim 1.

Applicant proposes to cancel claims 3 and 20 herein, rendering the rejection moot as to those claims.

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Applicant respectfully requests that the rejection based on Houck be withdrawn.

Rejections under 35 U.S.C. § 103

Claim(s) 12-17 are rejected under 35 U.S.C. 103 as being unpatentable over Houck in view of Henry (US 8,857,530). Applicant respectfully traverses this rejection.

The Final Office Action relies on Henry as teaching specific sensors and controls recited in claims 12-17. However, Henry does not appear to cure the deficiency identified above with respect to the rejections under 35 U.S.C. § 102. Thus, amended claim 1 is not obvious based on Houck in view of Henry. Claims 12-17 are allowable at least because they depend from claim 1. Applicant respectfully requests that the rejection be withdrawn.

Other issues

Claim 18 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicant submits that claim 1, as amended, is allowable as set forth above. Thus, claim 18 is also allowable. Applicant respectfully requests that the objection be withdrawn.

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CONCLUSION

The amendments above should be entered by the Office because the amendments are supported by the as-filed disclosure and do not add new matter to the application. If the Examiner determines that the amendments do not place the application in condition for allowance, entry is respectfully requested upon filing of a Notice of Appeal herein.

No additional fees are believed due, but the Commissioner is hereby authorized to charge any additional fees which may be required, or to credit any overpayment, to Deposit Account No. 010442.

Claims 1, 4–19, and 21 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain that might be resolved by a telephone conference, the Examiner is respectfully invited to contact Applicant's undersigned attorney.

Respectfully submitted,

/Nathan E. Whitlock/

Nathan E. Whitlock
Reg. No.: 65744
AGCO Corporation
Patent Department
420 W Lincoln Blvd
Hesston, KS 67062
Phone: (620) 217-5111

Date: February 17, 2023

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PATENT AND TRADEMARK OFFICE

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/470,472	**02/17/2023 01:45:05 PM ET**	**US1640/WO-US**

Title of Invention

IMPLEMENT CONTOURING TOOLBAR

Application Information

APPLICATION TYPE	Utility - U.S. National Stage under 35 USC 371	PATENT #	-
CONFIRMATION #	1653	FILED BY	Wontu Bivins
PATENT CENTER #	61614081	FILING DATE	06/17/2019
CUSTOMER #	88988	FIRST NAMED INVENTOR	Benjamin Anson Fanshier
INTL. APPLICATION #	-	INTL. FILING DATE	-
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Nathan Whitlock

Documents

TOTAL DOCUMENTS: 4

DOCUMENT		PAGES	DESCRIPTION	SIZE (KB)
AFCP sb0434.pdf		2	After Final Consideration Program Request	221 KB
US1640WOUS Final OA_response.pdf		11	-	219 KB
US1640WOUS Final OA_response-A.NE.pdf	(1-1)	1	Response After Final Action	77 KB
US1640WOUS Final OA_response-CLM.pdf	(2-5)	4	Claims	107 KB
US1640WOUS Final	(6-11)	6	Applicant Arguments/Remarks	204 KB

OA_response-REM.pdf	Made in an Amendment

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
AFCP sb0434.pdf	5408CA42314D92DC898EC7671A02F08A82EBE0E30F7D400B4 A641FE61B69608F2AD6D5CE42C6EC1F04A3E070F19526F669 3609B51574BC03AD96A77FAC8865E9
US1640WOUS Final OA_response.pdf	0BD27BFE9B33E566666B06AEDD33C16E868A83B4AC911FAD 4E4C1B4C922657310273490686ADD30844E1A0D8AFBEA07CF D08D92B7C09A589A278B1884908FA80
US1640WOUS Final OA_response-A.NE.pdf	436658F7D17F7DBEE17D953F0DCF14D2D9900EECC2E4EFB5 D49561AC545E89D0402E5B6F974B5E657B690706E790812FB0 ECA3E56DD278B61C74FFF8322A35CE
US1640WOUS Final OA_response-CLM.pdf	54512161EBFE2595FD73D4278333AFFA0EA2EF217A31FFFCA A5D481C97B3F5BC75B8B565940F7AF4F165ABAF0C014ACE42 345AD31B027B2F22FB17976E1C40A2
US1640WOUS Final OA_response-REM.pdf	F6EB424BD400871C36269BD5FD33D7E9A6C3D1B39E15406A9 1AA0AF01A7805DE9F854261DA51DAFC073A94053DDFA70A9 D8BAD5877BEAB63037A5B0AE24788EF

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an

international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014, OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/470,472	Filing Date 06/17/2019	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

AMENDMENT	02/17/2023	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 18	Minus	** 20	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/DANTE SMITH/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/SB/08a (01-22)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16470472
Filing Date	2019-06-17
First Named Inventor	Benjamin Anson FANSHIER
Art Unit	3671
Examiner Name	Jessica H. Lutz
Attorney Docket Number	US1640/WO-US

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16470472
	Filing Date	2019-06-17
	First Named Inventor	Benjamin Anson FANSHIER
	Art Unit	3671
	Examiner Name	Jessica H. Lutz
	Attorney Docket Number	US1640/WO-US

	1	BRAZILIAN PATENT OFFICE, Third Party Petition for related BR Application No. BR112019010534-4, dated 17 JAN 2023, 88 pages (including translation).	X
	2	BRAZILIAN PATENT OFFICE, Office Action (with translation) for related BR Application No. BR112019010534-4, dated 14 JAN 2023, 16 pages.	☒

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16470472
	Filing Date	2019-06-17
	First Named Inventor	Benjamin Anson FANSHIER
	Art Unit	3671
	Examiner Name	Jessica H. Lutz
	Attorney Docket Number	US1640/WO-US

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Nathan E. Whitlock/	Date (YYYY-MM-DD)	2023-02-21
Name/Print	Nathan E. Whitlock	Registration Number	65744

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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INSTITUTO NACIONAL DA PROPRIEDADE INDUSTRIAL

01/17/2023 870230004612
16:00
0000421960681815

Presentation of subsidies to the technical exam

Case Number: BR 11 2019 010534 4

Interested Party Data

Interested 1 of 1

Name or Corporate Name: LEANDRO DE SOUZA CARVALHO

Type of Person: Natural Person

CPF/CNPJ: 08941943728

Brazilian nationality

Physical Qualification: Other occupations not previously specified

Address: Rua São Sebastião, n°525 Block 11A Apto 204, São Sebastião

City: Petropolis

State: RJ

CEP: 25645-045

Country Brazil

Telephone:

Fax:

Email: leogargula@gmail.com

Petition Reference

Order: BR112019010534-4

PETICIONAMENTO ELETRÔNICO

This request was sent through the Electronic Petitioning system on 01/17/2023 at 16:00, Petition 870230004612

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Documents attached

Annex Type	Name
clarification	Subsidies to the Exam.pdf
E1 US9301439B2	E1 US9301439B2.pdf
E2 -D2 US2015230391A1	E2 -D2 US2015230391A1.pdf
E5 US5065681A	E5 US5065681A.pdf
E6 US9031749B2	E6 US9031749B2.pdf
E7 US2003024450A1	E7 US2003024450A1.pdf
E8 US8857530B2	E8 US8857530B2.pdf
D4 US8573319B1	D4 US8573319B1.pdf
E4 DE102006034798B4 and translation	E4 DE102006034798B4 and translation.pdf
E3 - EP2335465B1	E3 - EP2335465B1.pdf
E3 - EP2335465_translation	E3 - EP2335465_translation.pdf

statement of veracity

☑ I declare, under penalty of law, that all information provided above is complete and true.

PETICIONAMENTO ELETRÔNICO

This request was sent through the Electronic Petitioning system on 01/17/2023 at 16:00, Petition 870230004612

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Invention Patent Application: BR112019010534-4 of 05/23/2019

PCT: #PCT/IB2017/001298 of 10/26/2017

Priority: US #62/435,118 of 12/16/2016

Title: MACHINERY THAT CONTOURS TOOLBAR

Owner: AGCO CORPORATION

LEANDRO DE SOUZA CARVALHO, Brazilian, married, CPF 089.419.437-28, as an interested party in the market and technologies related to machines and agricultural implements, comes, in a timely manner, pursuant to article 31 of Law of Industrial Property (LPI), present

SUBSIDIES FOR THE TECHNICAL EXAMINATION

of the patent application **BR112019010534-4,** entitled **"Machinery that surrounds the toolbar",** deposited on 05/23/2019 in the name of **AGCO CORPORATION, as** it does not meet the requirements of patentability, and must be DENIED in its entirety, for the reasons herein brought to the exam.

I - TIMELINESS:

1. As established in Article 31 of the Industrial Property Law No. 9,279 of May 14, 1996 (LPI), LEANDRO DE SOUZA CARVALHO comes, in legitimate interest, present documents and information to subsidize the examination of the patent in question.

> *"... Once the patent application is published and until the end of the examination, it will be the presentation, by the interested parties, of documents and information to support the exam.*

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II - PATENT APPLICATION BR112019010534-4:

2. This application concerns a system with a frame element (20), a tool bar (22) coupled to said frame element by means of an articulated joint, the tool bar (22) being parallel and in back of the frame member (20); row units coupled to the bar tools (22), a first sensor (50) coupled to the tool bar (22) to detect the position of the toolbar relative to the ground and a trigger between the frame element (20) and the tool bar (22) to guide the bar of tools containing said unit of rows in relation to the element of frame based on the position of the toolbar relative to the ground, detected by said sensor.

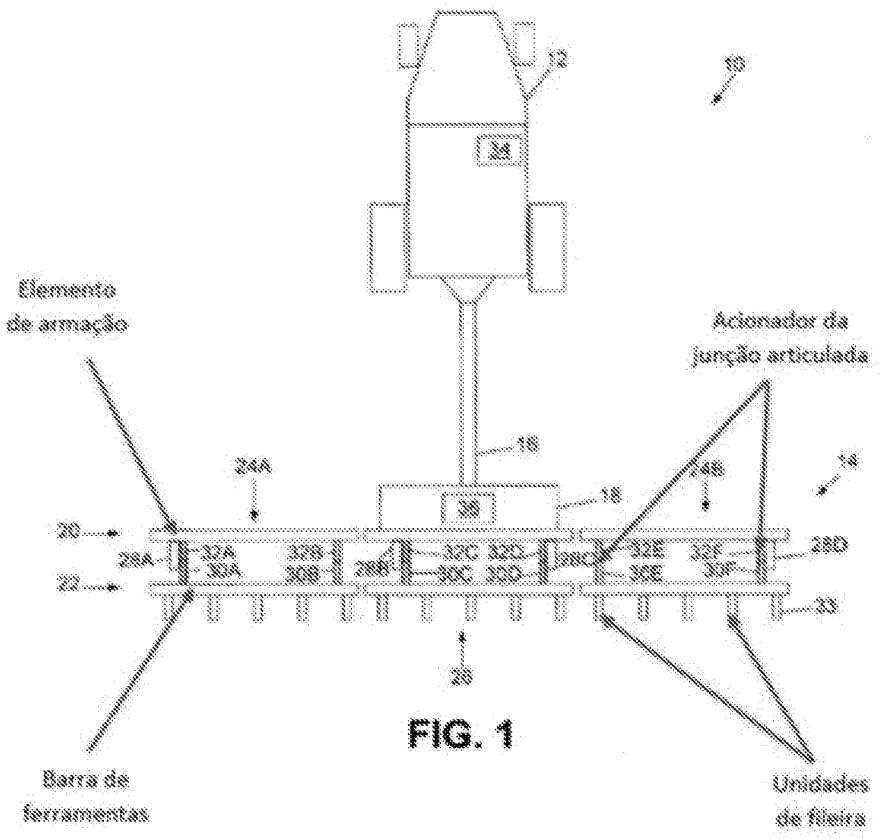


FIG. 1

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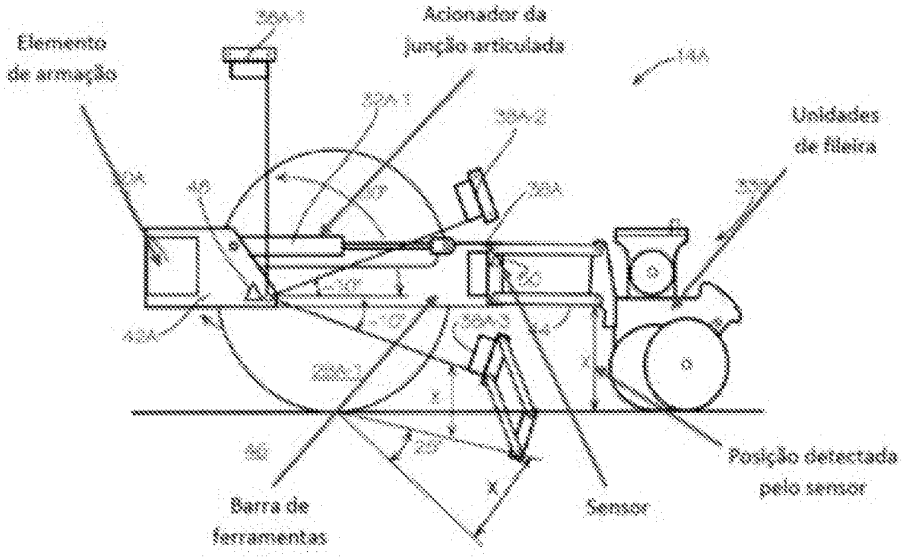


FIG. 3

III - ORDER HISTORY:

3. This patent application had requirement 6.23 published in RPI 2644 of 08/09/2021. The Holder AGCO CORPORATION presented compliance with requirement through petition 870210111916 of 12/02/2021, in which he amended the claims framework.

4. Subsidies were also presented for the technical examination by third parties, through petitions 870220004301 of 01/17/2022, with an addition in petition 870220038309 of 05/03/2022, and 870220074436 of 08/18/2022.

5. Subsequently, this application was published in an unfavorable opinion (7.1) in RPI 2701 of 10/11/2022. In his opinion, Mr. Examiner evaluated the fulfillment of requirement 6.23 presented by the holder and the first two subsidy petitions, filed by JIMER RAMOS DA COSTA.

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However, the third subsidy petition, filed by LEANDRO DE SOUZA CARVALHO (current Claimant) was not analyzed by said INPI technical opinion.

6. In his technical opinion 7.1, **Mr. Examiner rightly considers that changes to the set of claims made by the holder of the claim in compliance with requirement 6.23 could not be accepted, as they were increased scope of protection.** Consequently, the claim framework valid and analyzed in the opinion was what appears in the request for deposit of the request.

7. Then Mr. Examiner points out a series of irregularities in the present patent application and points to documents US2015230391 **(D2)** and US8573319 **(D4)** as precedents that **anticipate the patent application with in relation to INVENTIVE ACTIVITY.**

8. Finally, through petition 870230001509 of 01/06/2023, the holder of the request AGCO CIRPORATION submitted a Manifestation to the technical opinion, with arguments and changes in the text of the request, which will be discussed here.

9. The new set of claims presented in the aforementioned petition was reformulated as below an independent claim, namely:

"1. System comprising:

a frame member (20, 54) having wheels (28) coupled thereto;

a tool bar (38, 56) coupled to the frame member (20, 54) by means of an articulated joint, the tool bar (38, 56) oriented parallel to, and at the rear of, the frame member (20, 54);

a row unit (33) coupled to the tool bar (38, 56); and

an actuator (32, 62) coupled between the frame member (20, 54) and the tool bar (38, 56), the actuator (32, 62) configured to rotate the tool bar (38, 56) in relation to the frame element (20, 54),

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characterized by the fact that *the system also comprises a first sensor (50, 70) coupled to the tool bar (38, 56), the first sensor (50, 70) configured to detect a toolbar position (38, 56) at with respect to the ground, in which the tool bar (38, 56) is rotated based on a detected position of the toolbar (38,56)."*

IV - PATENTABILITY REQUIREMENTS:

10. According to Industrial Property Law No. 9,279 of May 14, 1996 (LPI), Article 8, *"The invention that meets the requirements of novelty, inventive step and industrial application".*

11. For the purposes of this law, the invention is endowed with novelty when not understood in the state of the art, as established in its Article 11 and inventive step whenever, for a person skilled in the art, it does not result from evident or obvious way of the state of the art, according to its Article 13º.

12. That said, the Applicant clarifies that the application in question, at least, DOES NOT INVOLVE INVENTIVE ACTIVITY in view of the state of the technique known at the time of its filing. Therefore, the present patent application for invention does not comply with the provisions of Articles 8 c/c 13 of the LPI, as will deduce from the analysis of the documents brought herein, which prevent the granting of the request here in vogue.

V - INVENTIVE ACTIVITY:

13. In its response to opinion 7.1, the holder of the patent application states that **D2** discloses a system with a frame element and row units in the figure 4, but it does not reveal a toolbar attached to the structure through of an articulated joint, nor an actuator configured to rotate the

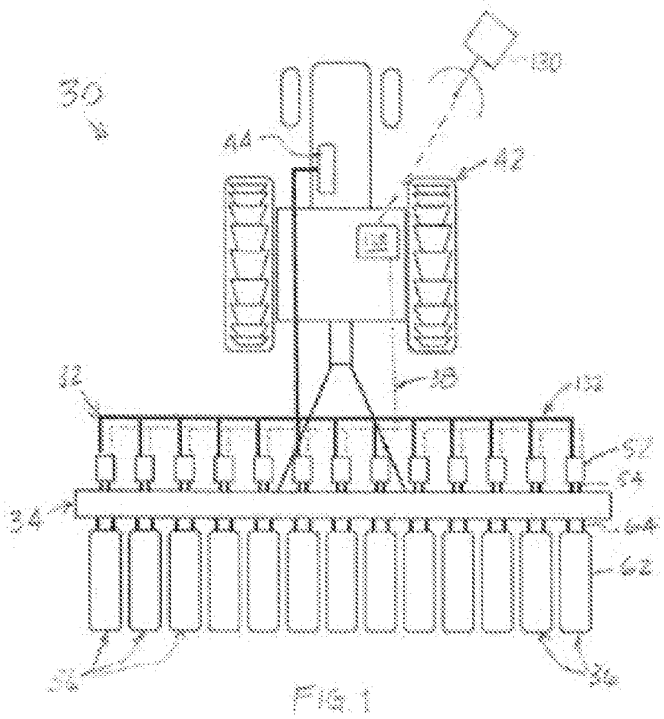
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tools. In particular, the row units are connected directly to the implement structure 34.

14. However, paragraph [0028] of **D2** reveals that each of the sets of seed line (36) includes **a ground hitch attachment or cultivation line (52) coupled to a rigid structure** (53) by a **first hinge (54) operatively around a pivot** (55), the rigid frame (53) depending on the structure of the implement (34).

15. Paragraph [0055] of **D2** reveals that the connecting link (252) follows rotation of the first joint (54) so that the tie rod (256) causes the lever arm (228) rotate clockwise (274) at an angle +ÿ1 in relative to the base portion (224) of the position sensor (220).



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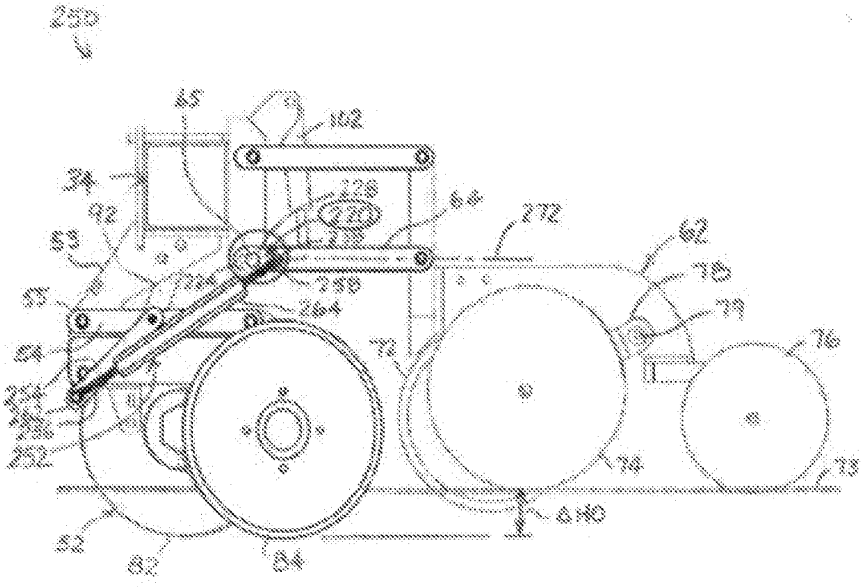


FIG. 8A

16. D2 also describes in paragraph [0033] that each planting unit 36 further comprises the position sensors 112 and 114 in the joints 54 and 64 of planting units 36, to detect the position and angular rotation of the respective joints.

[0033] Each of the seeding row assemblies **36** can further comprise a position sensing module **110**. In certain embodiments, the position sensing module **110** includes position sensors **112** and **114** operatively coupled to the first linkage **54** and the second linkage **64**, respectively, that output signals **116** and **118**, respectively, corresponding to the sensed position. The position sensors **112** and **114** are arranged to detect an angular rotation of the respective linkages **54** and **64** about their respective pivots **55** and **65**, as depicted herein, for example by a rotating potentiometer. In other embodiments, position sensing can be provided by magnetostrictive sensors or linear sliding devices, such as sliding potentiometers or linear variable differential transformers (LVDT). One embodiment of the position sensors **112**, **114** is discussed below attendant to FIG. **7**.

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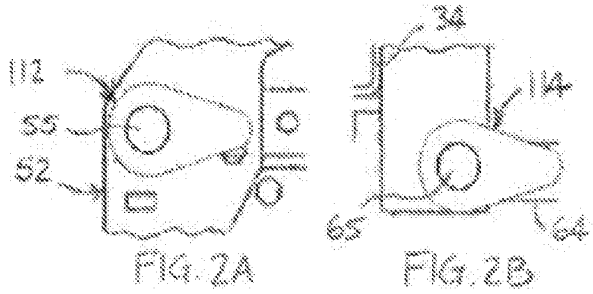


FIG. 2A FIG. 2B

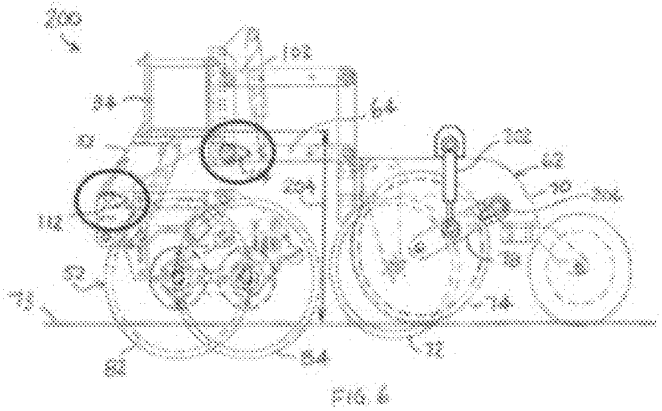


FIG. 6

17. So we can see that D2 preempts the join trigger articulated between the implement frame and the tool bar. **D2** features an **actuator,** such as a hydraulic cylinder, that acts to **pivot the toolbar based on position detected by position sensors in relation to the ground.** It remains clear that the **D2** has the technical characteristics described in the present patent application.

18. In its response to opinion 7.1, the applicant also states that the This opinion lists the third section of **D4** as the tool bar of claim 1 without explaining why or how that section of structure could be used in the **D2 system.** The holder understands that there is no reason to make such a modification in D2.

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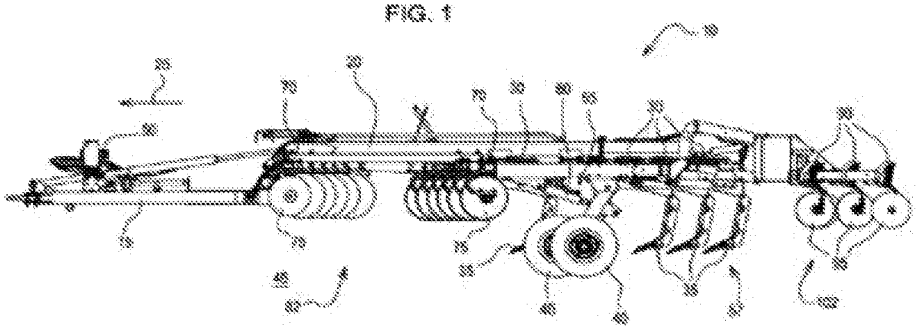
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19. However, the Claimant points out that a person skilled in the art could use the third section of **D4** in parallel or behind the frame element of D2, in this way the combination of **D4** and **D2** anticipates the characteristics of the claim 1 of the present patent application.

20. In addition, document **D4** presents a control system for a agricultural implement that includes a **position sensor** configured to measure a depth indication of an actual operating depth of a ground engagement tool and configured to generate a position signal corresponding. The system also includes a **pressure sensor** configured to measure a pressure indication of an actual and configured operating pressure to generate a corresponding pressure signal.

21. D4 also describes an **implement control unit** configured to receive the position signal and the pressure signal and configured to control an adjustment device so that the depth indication aim for a depth set point that is indicative of the depth pre-selected operating mode, provided that the pressure indication is within a preselected pressure range.

FIG. 1



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22. Also, in **D4,** the pivot point where the actuator is connected (see Figure 1 of **D4** below), provides toolbar rotation during actuator performance. Therefore, the toolbar rotates relative to the frame (link) as shown in the movement of pivot points in fig. 1 to fig. 2 of **D4,** which have a pivot point relative to the frame element which allows lifting the toolbar.

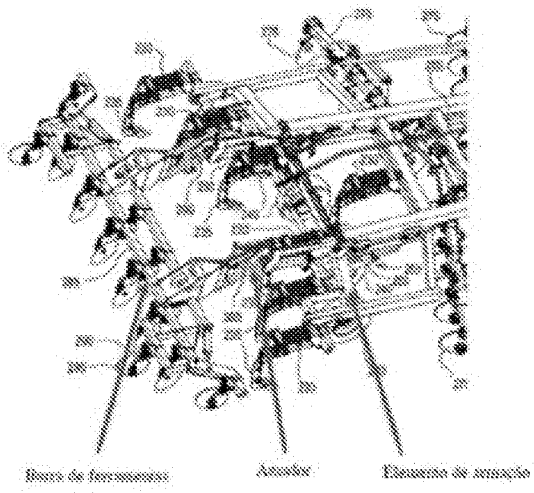


Fig. 1B de D4, desenho com comentários

23. Document **D4,** in its claim 1, anticipates this request in a control system comprising: **a position sensor configured to measure an actual operating depth indication of the tool ground engaging and configured to generate a position signal.**

24. Additionally, the Applicant reiterates the arguments presented previously through petition 870220074436 of 08/18/2022, which has not yet were considered by Mr. Examiner in his science opinion 7.1.

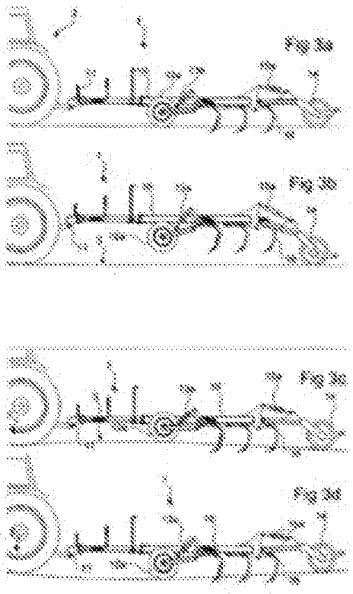
25. The Applicant presented in its subsidies 8 documents of anteriority, then identified as D1 to D8. On this occasion, the

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Applicant identifies the same documents as E1 to E8 to facilitate the understanding. The aforementioned D2 document is the same as E2. You documents E1 to E8 are restated below:

E1: US9301439B2 – Agricultural implement and method for controlling an agricultural implement – published 4/5/2016.

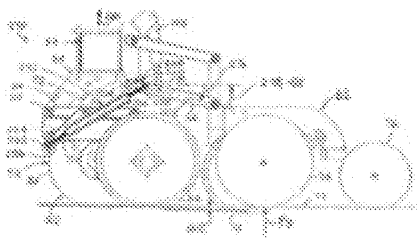


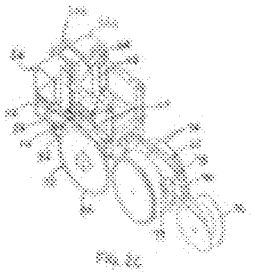
E1 refers to an agricultural implement to work the ground, self-propelled or towed, comprising a structure, first and second units of in-depth maintenance that comprise first and second hydraulic actuators to adjust the height of the first and second units of maintenance of depth in relation to the structure, respectively, and at least one tool for engagement work with the ground. The first and second Hydraulic actuators are connected to valves that supply hydraulic fluid to the system. a first side of the first hydraulic actuator communicates with a first side of the second hydraulic actuator and a measurement engine configured to provide a measured value corresponding to a first quantity of hydraulic fluid occurring in the mentioned first sides.

E2: US2015230391A1 - Depth control for a seed planting system – published in 08/20/2015.

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E2 refers to a planting system that includes a plurality of line sets of sowing, each comprising components that are held at an elevation controlled. The seeding row set includes a crop line unit





controlled to maintain a desired elevation with respect to a line unit of seeding. Each line set seeding can include two position sensors that generate signals corresponding to the elevation of the seeding row unit and ground hitch attachment respectively, or a differential position sensor that generates signals corresponding to the difference in elevations. Various embodiments include a local loop controller which adjusts the elevation of the crop row unit relative to the row unit seeding to a desired set point. In some embodiments, the strength downstream seeding row unit is actively controlled.

E3: EP2335465B1 – Agricultural machine – published on 05/23/2012.

E3 refers to a machine agriculture, particularly seeder, comprising a machine structure and a sensing element that is attached to a ground working element for deflection detection of ground working elements against a support structure. A computer

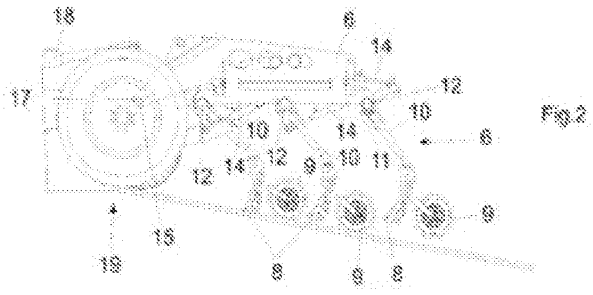


Fig 2

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board is coupled to the agricultural machine, where the sensor element transmits the signals to the on-board computer.

E4: DE102006034798B4 – Agricultural machine ie semi-trailed seeder, for working on eg planar ground, has quadruplet articulation provided such that transversal support that makes rotary movement, during ascending movements of articulation - published on 02/13/2014.

E4 refers to a machine, for example, a seeder, which has a quadruple joint provided in such a way that a transverse support makes a rotation movement, during the upward movement of the joint.

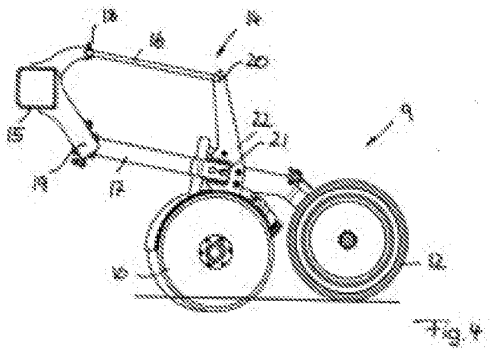


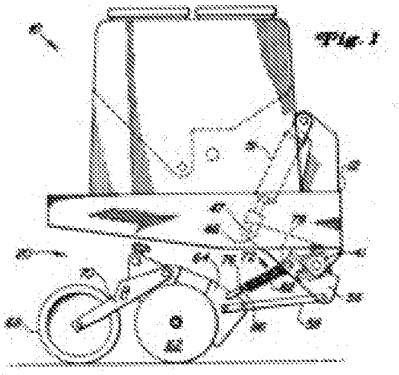
Fig. 1

The rotating movement of the support provides, in a position of operation, in a region of a work unit distant from a mechanism of rolling, an upward movement more tense than in another region of the unit, where this last region is farthest from the mechanism. The dots of articulation are spaced apart by a small distance.

E5: US5065681A – Hydraulic down pressure structure for an implement with multiple ground engaging tools – published 11/19/1991.

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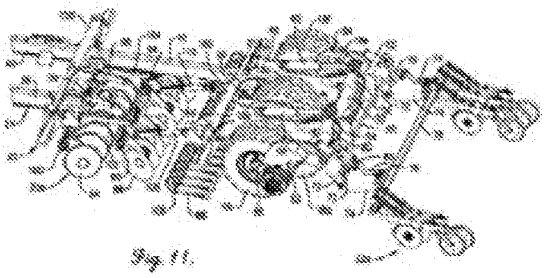
E5 refers to a pressure arrangement



improved descender for an implement,
such as a seeder with rows of various
sections, with fixed-height section structures
with corresponding groups of sets of
opener. The opener sets of each group
are flexibly tilted downwards by
a spring and support structure operatively
connected to a crankshaft. One crankshaft per group is supplied and each
crankshaft is controlled by a single down pressure adjustment cylinder.
Cylinders are connected in parallel and to a pressure regulator to provide
Adjustable and uniform average downward pressure to the opener in conditions
uneven ground. Tension links connected to the support structure allow
opener assemblies are lifted from a working position on the ground
to a transport position.

E6: US9031749B2 – Cultivation air seeder having sequentially operated tools –
published on 05/12/2015.

E6 refers to a seeder equipped with



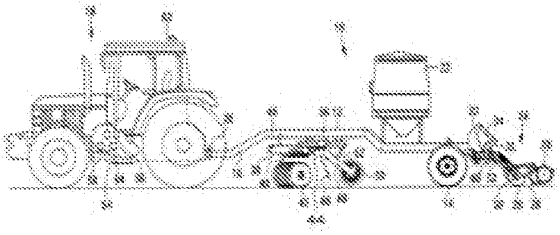
from a dispenser to dispense
seeds from a hopper to a
rate measured when the dispenser is
activated. groove openers are
provided behind cultivators to prepare furrows, which will receive seeds
from the hopper when the openers are engaging the ground; on what
openers are selectively liftable from a lowered engagement position with
the ground to an elevated position where the openers do not come into contact with

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the soil. An operation and control system deactivates the doser and raises the cultivators and openers in a predetermined sequence.

E7: US20030024450A1 – Controller for a cultivating and seeding machine – published on 02/06/2003.

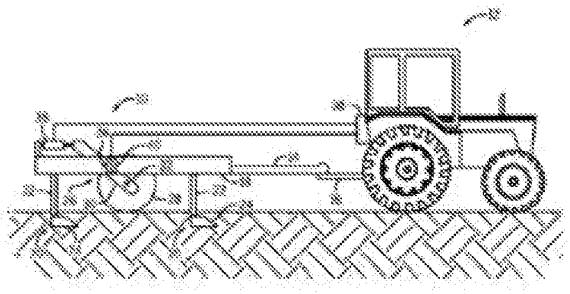
E7 refers to a machine cultivation and sowing supplied with a seeding unit and a tillage device and/or a roller of land. The sowing unit is supplied with an actuator



seeding, the tillage device is supplied with a tillage actuator and the earth roller is supplied with a earth roller actuator. The sowing actuator regulates the seeding depth of the seeding unit, while the plowing and earth roller actuators regulate the downward pressure of these two implements, respectively. A controller that has a memory loaded with information to adjust the work implements, controls the various actuators in response to these data records.

E8: US8857530B2 – Automatic depth control system for an agricultural implement – Published 9/13/2012.

E8 refers to a system of agricultural implement that includes an implement and a drive configured fluid control to be attached to a vehicle trailer. The system in



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Agricultural implement also includes a depth control cylinder
arranged on an implement chassis and fluidly coupled to the drive unit.
fluid control. The depth control cylinder is set to
adjust the depth of penetration of a ground penetration tool on the
implement by varying the height of a coupling disc assembly on the
ground. In addition, the agricultural implement system includes a sensor coupled
communicatively to the fluid control unit and configured to emit
signs indicating the penetration depth of the penetration tool in the
ground. The fluid control unit is configured to control
Automatically flow fluid to depth control cylinder
based on signals sent by the sensor to maintain a depth of
penetration selected by the user.

26. According to art. 5, items I and II of Normative Instruction No. 30, the **Independent Claims must protect essential technical features to the realization of the invention.**

Art. 5º As reivindicações independentes devem cumprir as seguintes especificações:

I. as reivindicações independentes visam a proteção de características técnicas essenciais e específicas da invenção em seu conceito integral, cabendo a cada categoria de reivindicação pelo menos uma reivindicação independente;

II. cada reivindicação independente deve corresponder a um determinado conjunto de características essenciais à realização da invenção, sendo que somente será admitida mais de uma reivindicação independente da mesma categoria se tais reivindicações definirem diferentes conjuntos de características alternativas e essenciais à realização da invenção, ligadas pelo mesmo conceito inventivo;

27. As previously pointed out, the new set of claims
presented has an independent claim, namely:

"1. System comprising:

a frame member (20, 54) having wheels (28) coupled thereto;

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a tool bar (38, 56) coupled to the frame member (20, 54) by means of an articulated joint, the tool bar (38, 56) oriented parallel to, and at the rear of, the frame member (20, 54);

a row unit (33) coupled to the tool bar (38, 56); and

an actuator (32, 62) coupled between the frame member (20, 54) and the tool bar (38, 56), the actuator (32, 62) configured to rotate the tool bar (38, 56) in relation to the frame element (20, 54),

***characterized by the fact that** the system also comprises a first sensor (50, 70) coupled to the tool bar (38, 56), the first sensor (50, 70) configured to detect a toolbar position (38, 56) at with respect to the ground, in which the tool bar (38, 56) is rotated based on a detected position of the toolbar (38,56)."*

28. Thus, as established by the regulations, this application as amended, deals with a system, which comprises the following **ESSENTIAL TECHNICAL CHARACTERISTICS:**

I) *a first sensor (50, 70) coupled to the tool bar (38, 56), the first sensor (50, 70) configured to detect a position of the toolbar (38, 56) in relation to the ground, in that the toolbar (38, 56) is rotated based on a toolbar detected position (38,56)*

29. Analyzing the essential technical characteristics in view of the state of technique, we have:

Document E1 - US9301439B2

30. E1 describes agricultural implements for work connected to the soil, in that you want to maintain the working depth of the work tools

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attached to the implement, at a uniform depth (see column 1, lines 65-67 of E1).

SUMMARY OF THE INVENTION

An object is therefore to provide an improved system for as adjusting the working depth or height of an agricultural implement.

31. Therefore, **E1** proposes a solution to the same technical problem as the this request seeks to remedy, as described in paragraph [002] of the report description of this application, namely, keep the work tools coupled to the agricultural implement at the same soil depth, even when the implement moves over terrain with plateaus or gullies.

32. To this end, **E1** 's invention provides for a hydraulic system comprising **hydraulic actuators** (13 and 15) controlled by a **control unit** (20), in response to signals generated by **the position sensors** (18, 19). the sayings **position sensors** (18, 19) can be angle sensors arranged in one or more both hydraulic cylinders (13 and 15).

33. Figures 4 to 7 of **E1** refer to the use of a hydraulic system in a precision seeder, in which hydraulic cylinders (113) are placed between the transverse beam (110) of the implement structure and planting units (116) and are controlled by position sensors (118, 119).

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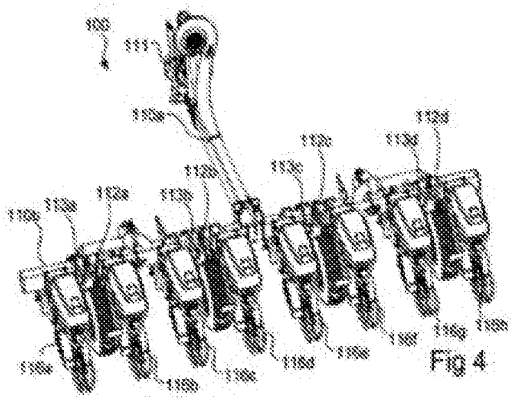


Fig 4

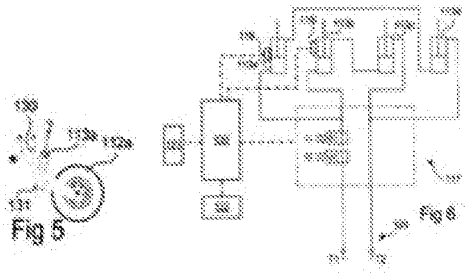


Fig 5

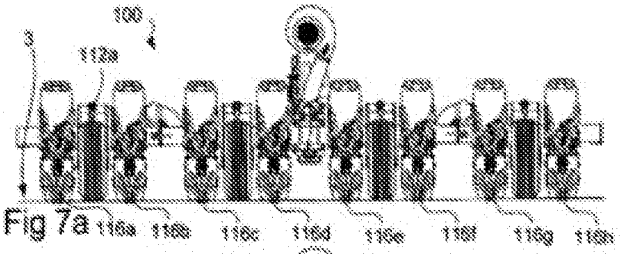


Fig 7a

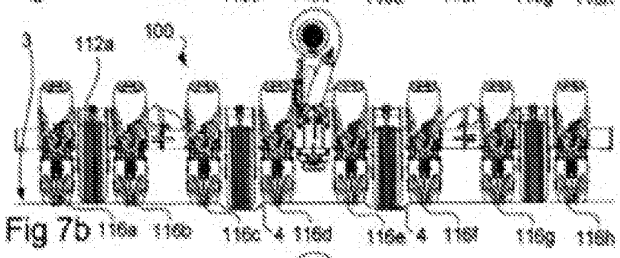


Fig 7b

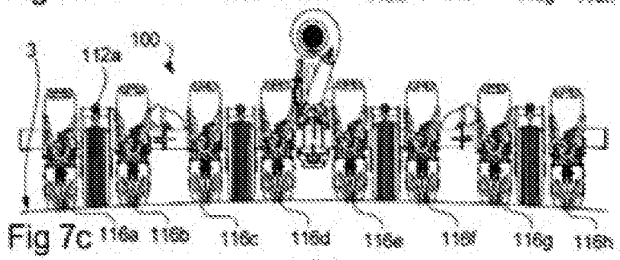


Fig 7c

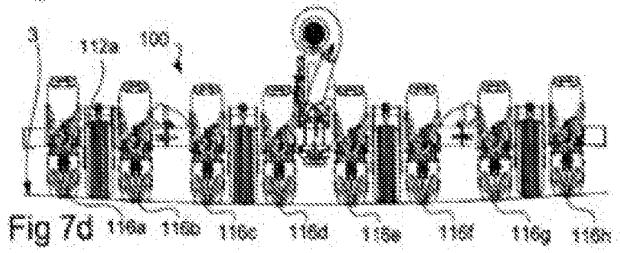


Fig 7d

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34. Therefore, as in the patent application now under analysis, **E1** already teaches provide a **system** for agricultural implements, in which the toolbar is controlled by means of hydraulic actuators that respond to the positions detected by position **sensors .**

35. That said, it is clear that the invention described in **E1** presents the **technical features** described in this patent application and solves the same technical problem presented. In this way, **the invention of the present request is anticipated by the teachings of the E1 document.**

Document E2 - US2015230391A1

36. Document **E2** describes a planting system that includes a plurality of seeding row sets, each having components kept at a controlled elevation (see paragraphs [040] to [061]).

37. The applicant understands that **E2** has **a rigid frame (53) that couples both a crop row unit (52) pivotally and a toolbar (34), which a plurality of row units Planting tool (62) is attached to the toolbar.**

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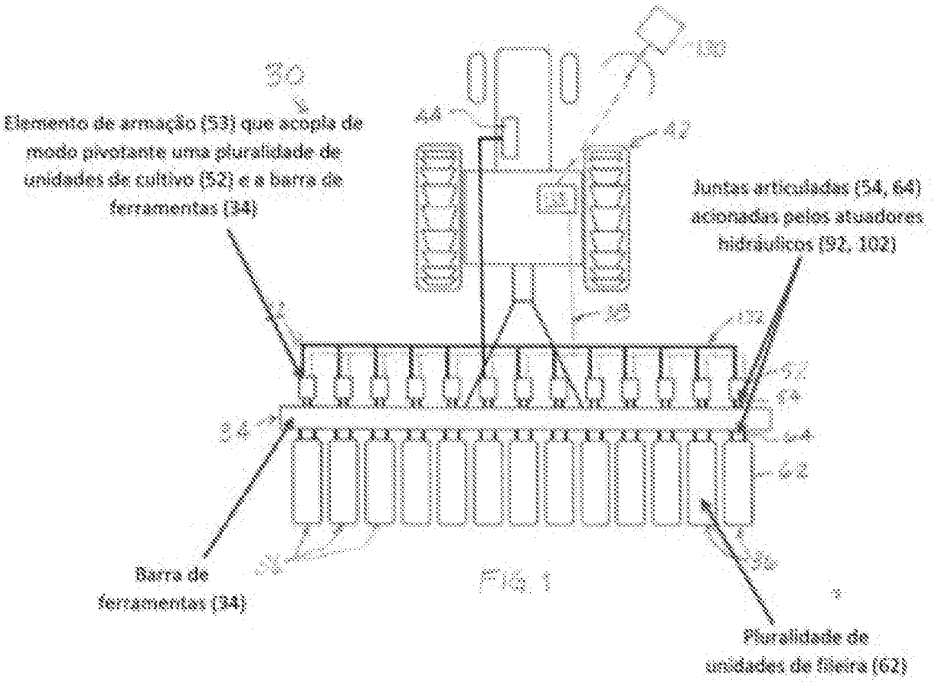


Fig. 1

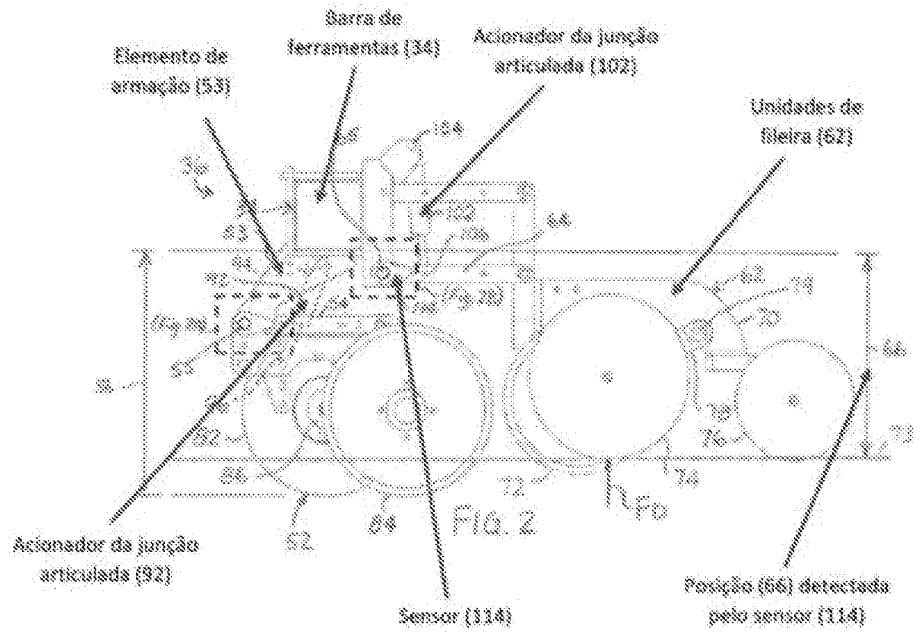


Fig. 2

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38. According to **E2,** the disclosed system may include a line actuator cultivation (92) operationally coupled between the bar (34) of the implement and the cultivation row unit (52) or connection (54), to adjust the elevation (56) of the cultivation row unit (52) with respect to the bar (34), wherein said unit cultivation row (52) is coupled to the implement frame (53).

> *"[0028] Each of the seed row assemblies 36 includes a ground engaging attachment or tillage row unit 52 coupled to a rigid frame 53 by a first linkage 54 operatively about a pivot 55, the rigid frame 53 depending on the implement frame 34."*

> *"[0030] Each of the seed row assemblies 36 can further include a tillage row actuator 92 operatively coupled between the implement frame 34 and the tillage row unit 52 or linkage 54, the tillage row actuator 92 including a base portion 94 and a free portion 96, the free portion 96 being translatable relative to the base portion and being operatively coupled with the tillage row unit 52 for adjustment of the elevation 56 of the tillage row unit 52 relative to the implement frame 34."*

39. Therefore, although **E2** 's invention differs from the present application by comprising a second hinged joint actuator between the row unit seeding tool (62) and the toolbar (34), this **already anticipates the trigger of joint articulated between the frame (53) of the implement and the bar of tools (34).**

40. In paragraph [0033] of **E2,** it is also described that each of the sets of seeding line 36 may further comprise a module for detecting position 110. In certain embodiments, the position detection module 110 includes

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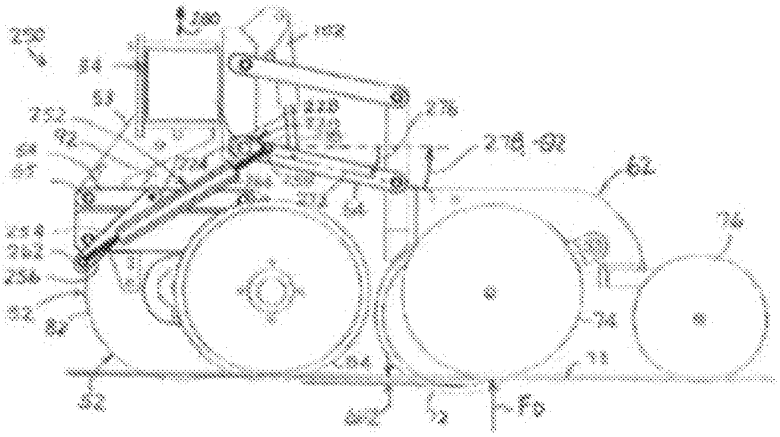
position sensors 112 and 114 operatively coupled to the first connection 54 and to the second connection 64, respectively, which emit signals 116 and 118, respectively, corresponding to the detected position. Position sensors 112 and 114 are arranged to detect an angular rotation of the respective connections 54 and 64 on their respective pivots 55 and 65, as represented in this document, for example by a rotary potentiometer.

[0033] Each of the seeding row assemblies **36** can further comprise a position sensing module **110**. In certain embodiments, the position sensing module **110** includes position sensors **112** and **114** operatively coupled to the first linkage **54** and the second linkage **64**, respectively, that output signals **116** and **118**, respectively, corresponding to the sensed position. The position sensors **112** and **114** are arranged to detect an angular rotation of the respective linkages **54** and **64** about their respective pivots **55** and **65**, as depicted herein, for example by a rotary potentiometer. In other embodiments, position sensing can be provided by magnetostrictive sensors or linear sliding devices, such as sliding potentiometers or linear variable differential transformers (LVDT). One embodiment of the position sensors **112**, **114** is discussed below attendant to FIG. **7**.

41. Paragraph [0035] of **E2** describes that in one embodiment, the actuators 92 and 102 are linear hydraulic cylinders (as shown) which are operatively coupled to a hydraulic pressure circuit 132 which is coming from, for example, the hydraulic pressure source 44 of the trailer unit 42. The hydraulic pressure circuit may include source lines 134 and supply lines. return 136. Other types of actuators can also be implemented, such as rotational hydraulic actuators, linear or rotational pneumatic actuators and/or linear or rotational actuators driven by an electric motor. In In some embodiments, all actuators are of the same type; other modalities use a mix of actuator types.

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[0035] In one embodiment, the actuators **92** and **102** are linear hydraulic cylinders (as depicted), which are operatively coupled with a hydraulic pressure circuit **132** that is sourced, for example, the hydraulic pressure source **44** of the towing unit **42**. The hydraulic pressure circuit can include source lines **134** and return lines **136**. Other type actuators can also be implemented, such as rotational hydraulic actuators, linear or rotational pneumatic actuators, and/or linear or rotational actuators powered by an electric motor. In some embodiments, all actuators are of the same type, other embodiments utilize a mix of actuator types.



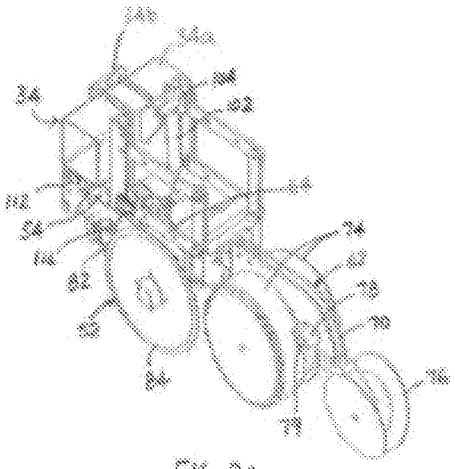


Fig. 2C

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42. Therefore, the planting system described in **E2** has an **actuator,** such as as a hydraulic cylinder, which acts to **pivot the toolbar with based on the position detected by ground position sensors.** the sensor position sensor (112) is coupled to the first connection (54) of the structure (34) and the sensor position switch (114) is coupled to the second connection (64) of the control unit structure. line (52), as described in the application contested herein.

43. It is clear that the invention described in **E2** has the **characteristics techniques** described in this patent application and solves the same problem technician presented. In this way, **the invention of the present application is anticipated by the teachings of the E2 document.**

Document E3 - EP2335465

44. Special emphasis should be given to document **E3,** which describes a agricultural machine comprising a machine frame supported by a chassis; a **support structure to** which **a planting row** is attached; a **hydraulic cylinder** is provided between the support structure and the support structure. machine; a **sensor element** is placed in the planting line and is connected to a on-board computer, so that, according to the signals sent by the sensor, **the hydraulic cylinder moves the support structure to maintain the deflection of approximately equal planting lines** (see paragraphs [008] to [013] of E3).

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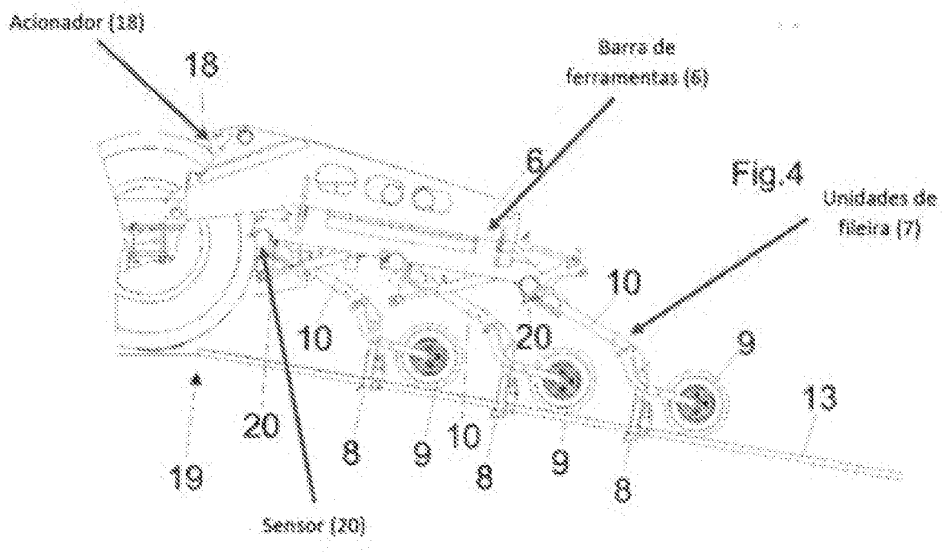


Fig.4

"[0009] On the back of the machine frame 1, a support frame 6 is arranged. A working unit 7 is arranged on this support frame 6. working unit 7 comprises soil cultivation elements designed as sowing coulters 8 with associated depth control and/or pressure rollers 9." (free translation)

"[0012] In order to remedy this situation, the support frame 6 must be pivoted about the pivot axis 17 running through the joint arrangement 15 by means of the hydraulic cylinder 18, as shown in FIGS. 3 and 4. After pivoting, the support frame 6 is parallel to the soil surface 13 to be processed, so that all coulters 8 penetrate the soil 13 to the same depth and the rollers 9 are pressed against the soil 13 by the spring force. (free translation)

[0013] In order to achieve this automatically, a sensor element 20 for detecting the deflection of the holding arm 10 of the soil cultivation element 8 relative to the support frame 6 is assigned to one soil cultivation element 8 of the front transverse row and the

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rear transverse row. This sensor sends 20 signals and data to an on board computer 21 arranged on the tractor 5. An evaluation program is stored in the memory of on-board computer 21, by means of which the control elements of motorized actuating device 18 are actuated by on-board computer 21 in such a way that, by pivoting support frame 6 using actuating device 18, the deflection of soil tillage elements 8 in the first transverse row is at least approximately equal to the deflection of soil cultivation elements 8 of the rear transverse row relative to the support frame 6, as shown in FIGS. 3 and 4 show. By means of this evaluation program of the on-board computer 21 and the detection of the position of the holding arms 10 of the soil tillage elements 8 relative to the support frame 6, the position of the support frame 6 relative to the soil tillage elements 8 and thus to the contour of the soil surface 13 can be adjusted during the entire tillage process and the deflection of the soil tillage elements 8 of the rear transverse row compared to the support frame 6 and the deflection of the soil working elements 8 compared to the first transverse row at least approximately the same and to keep. Thus, a uniform penetration depth of the tillage elements 8 or the seed coulters into the soil 13 is achieved."

(free translation)

45. As can be seen in Figure 3 (below) of the patent application in analysis, the sensor is arranged in the joint of the row unit, therefore, it **remains clear that the sensor of the patent application in question is arranged in the same sensor location described in E3.** It should also be noted that in this application for patent, the Applicant described the characteristics of the system differently than usually used by experts in the subject of this technical field.

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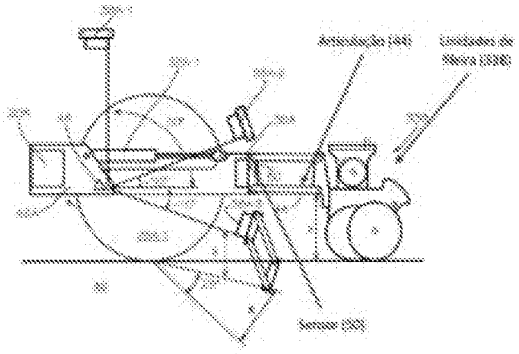


FIG. 3

46. In addition, the Applicant understands that the location where the sensor is arranged it is a mere design choice and does not generate advantages for the invention under analysis. THE descriptive report of the patent application under analysis corroborates for this understanding, as paragraph **[027]** also reveals that to allow the toolbar follows the outline of the field, information is received from a sensor on the relative position of the toolbar and, by extension, the position relative of the row unit in relation to the floor. That is, the place where the sensor is arranged, either on the toolbar or in the row unit, no interferes with the result achieved by the invention.

para todas as unidades de fileiras 33B. Em geral, para permitir que a barra de ferramentas 38A (e consequentemente, a barra de ferramentas 38A) siga o contorno do campo, são recebidas informações de sensor sobre a posição (relativa) da barra de ferramentas 38A (e por extensão, a posição relativa da unidade de fileiras 33B) em relação ao chão. Um

47. Thus, even if the Applicant of the present patent application claims that the sensor is arranged in a different location than the sensor described in **E3** (ie, the sensor is arranged in the row unit), for a person skilled in the art, it would be obvious to modify the location of the sensor, as such location is just a matter of of design.

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48. Finally, it is also understood that it would be obvious to a person skilled in the art combine the teachings of **E1** or **E2** with **E3,** in order to achieve a invention as of the present patent application, that is, a technician in the subject, of possession of the teachings of **E1** or **E2,** would be motivated to modify the machine of **E3,** in order to achieve an invention such as the present patent application in analyze.

49. That said, it is clear that the invention described in **E3** presents the **technical features** described in this patent application and solves the same technical problem presented. In this way, **the invention of the present request is anticipated by the teachings of the E3 document, alone or in combination with E1 or E2.**

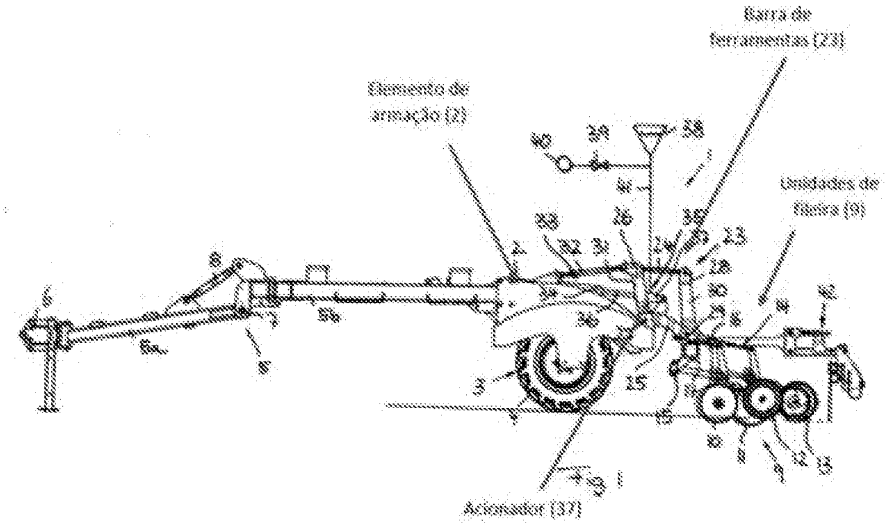
Document E4 - DE102006034798

50. Document **E4** describes an agricultural machine 1, particularly a seeder, equipped with a **machine structure** 2, which in turn comprises **a chassis 3 and a drive axle** 5. One end of the drive axle 5a is connected to a tractor and the opposite end 5b allows the chassis 3 to tilt independently of the height of the tractor, that is, the inclination of chassis 3 is adjusted by means of an actuator 8. **A planting row 9 is fixed to the structure machine** 2, and is articulated by means of a four-bar linkage 14 connected to a crosspiece 15 arranged in the rear portion of the chassis 3, **so that planting row 9 can be moved up and down relative to the crossbeam 15.** Still, to be able to adjust the working depth without changing the four-bar linkage geometry 23, the upper pivot point 26 on the frame side of the machine 2 is designed to be adjustable. **a device of pressure adjustment in the soil 35 is coupled to the planting line 9 and comprises**

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a hydraulic cylinder 37 (see paragraphs [0025] to [0028] and [0031] to [0033] of D4).



"[0025] The sowing machine 1 shown in the figures comprises a machine frame 2 which is supported on the ground via a chassis 3 which, in the embodiment shown, has a single-axle design and has wheels 4. The machine frame 2 can be attached via a drawbar 5 to a tractor, not shown, by means of a coupling piece 6 at the front end of the drawbar, which allows pivoting of the drawbar 5 about an upright pivot axis. In the illustrated embodiment, the drawbar 5 also includes a front drawbar section 5a, which is connected to a rear drawbar section 5b so that it can pivot about a horizontal transverse axis 7, so that the inclination of the machine frame 2 is independent of the height of the tractor-side coupling piece by buckling the drawbar about the transverse axis 7 can be adjusted by means of an actuator 8." (free translation).

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"[0026] A sowing unit 9 is fastened to the rear end of the machine frame 2 and is arranged following the chassis 3." (free translation).

"[0028] The sowing unit 9 is articulated via a first four-bar linkage 14 to a crossbeam 15 trailing behind the chassis 3 , so that the sowing unit 9 can be moved up and down in relation to the crossbeam 15". (free translation).

"[0031] In order to be able to adjust the working depth without changing the geometry of the four-bar linkage 23, the upper articulation point 26 on the machine frame side is designed to be adjustable." (free translation).

51. Also, **E4** proposes to solve the same inconveniences as the present one request aims to solve by means of a planting line that adapts better to the contours of a terrain (see paragraph [0005] of E4).

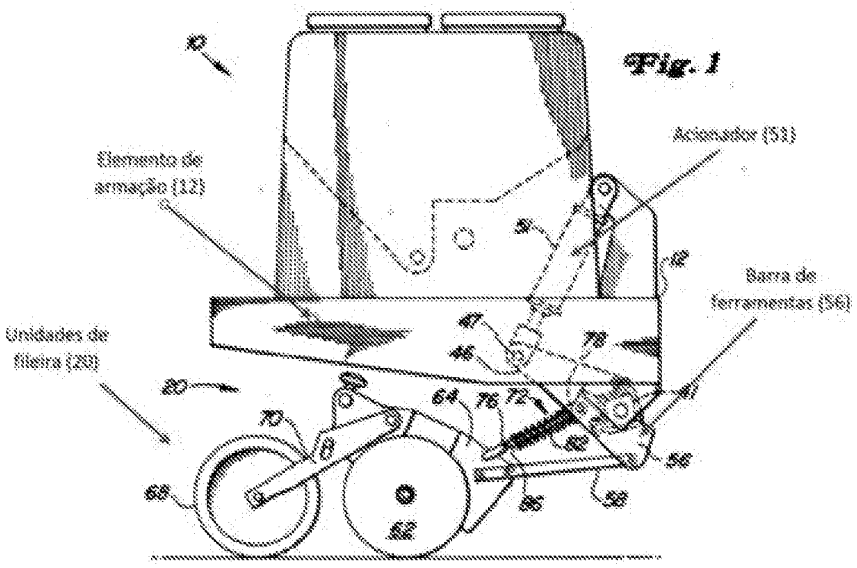
52. Thus, although **E4** does not describe the presence of a sensor to perform the inclination of the planting line, a technician in possession of the teachings of **E1, E2** or **E3,** would be motivated to modify the machine described by E4, adding a sensor so that the planting line better adapts to the sloping terrain contours, thus achieving an invention similar to that described by the patent application contested herein.

53. That said, it is clear that the invention described in **E4** presents the **technical features** described in this patent application and solves the same technical problem presented. In this way, **the invention of the present request is anticipated by the teachings of the E4 document in combination with E1, E2 or E3.**

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Document E5 - US5065681A

54. Document **E5** describes an **agricultural implement** 10 equipped with a **structure** 12 comprising a **transverse axis** 56, on which a **set of ground tools** 20 is connected. A **cylinder** 51 is also connected to the shaft transverse 56 and structure 12, so that when the cylinder is actuated (extended or retracted), axis 56 moves in such a way as to increase or decrease the pressure, respectively, of the soil tool set 20 relative to the ground (see column 2, line 65 to column 3, line 62 of E5).



"A plurality of ground engaging tool assemblies 20 are mounted for rocking vertically with respect to the frame 12 between a lowered ground engaging position (FIG. 1) and a raised transport position."

"Connected to each of the transverse rockshafts is a set of the ground engaging tool assemblies 20. A cylinder bracket 46 (FIG. 1)

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is also connected to each of the rockshafts and extends radially therefrom to a cylinder connecting end 47 which is pivotally connected to the rod end of one of three hydraulic cylinders 51, 52 and 53 associated with the respective sections 31, 32 and 33."

"Referring to FIG. I, as the cylinder 51 is extended the rockshaft 41 is rocked in the counter-clockwise direction to move the disk 62 and press wheel 68 into contact with the ground. Once in contact with the ground, further extension of the cylinder 51 causes the spring 82 to compress and urge the assembly 20 downwards. Therefore the downward pressure on the opener assembly 20 is dependent upon the pressure of the cylinder 51."

55. E5 proposes a solution for the same technical problem as the order in analysis seeks to remedy, as described in paragraph [002] of the descriptive report of this application, namely, keep the work tools attached to the agricultural implement at the same soil depth, even when the implement moves over terrain with plateaus or gullies.

BRIEF SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide an improved down pressure arrangement for an implement. It is another object to provide such an arrangement which achieves a more constant down pressure on the ground engaging tools, even in irregular ground surface conditions. It is still another object to provide such an arrangement which is simpler and has fewer hydraulic cylinders than at least many previously available down pressure devices.

56. On the other hand, **E5** does not describe the presence of a sensor to perform the movement of the planting line, and **E5** describes that the movement is performed by means of a pressure regulating valve and a operator control, in which the pressure is set via a control knob depression.

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57. In any case, an expert in the field in possession of the teachings of E1, **E2** or **E3** and seeking to automate the machine described by **E5,** would be motivated to add a sensor to the machine so that the planting line better adapts to the sloping contours of the terrain, thus achieving an invention similar to described by the patent application contested herein.

58. It is clear that the invention described in **E5** has the **characteristics techniques** described in this patent application and solves the same problem technician presented. In this way, **the invention of the present application is anticipated by the teachings of document E5 in combination with E1, E2 or E3.**

Document E6 - US9031749

59. Document **E6** describes a **pneumatic seeder** 10 comprising a **beam** 68, a transverse **tool bar** 78 fixed by means of connections 74, 76 to beam 68, and **opening tools groove** 22a attached to tool bar 78. A pair of **hydraulic cylinders** 80, 82 is fixed between beam 68 and connections 74, 76 and is intended to act to raise or lower the grooving tools 22a. The seeder can still comprising a **sensor** 83 for detecting when the hole opening tools groove 22a are in a down position (see column 4, lines 29-51 of E6).

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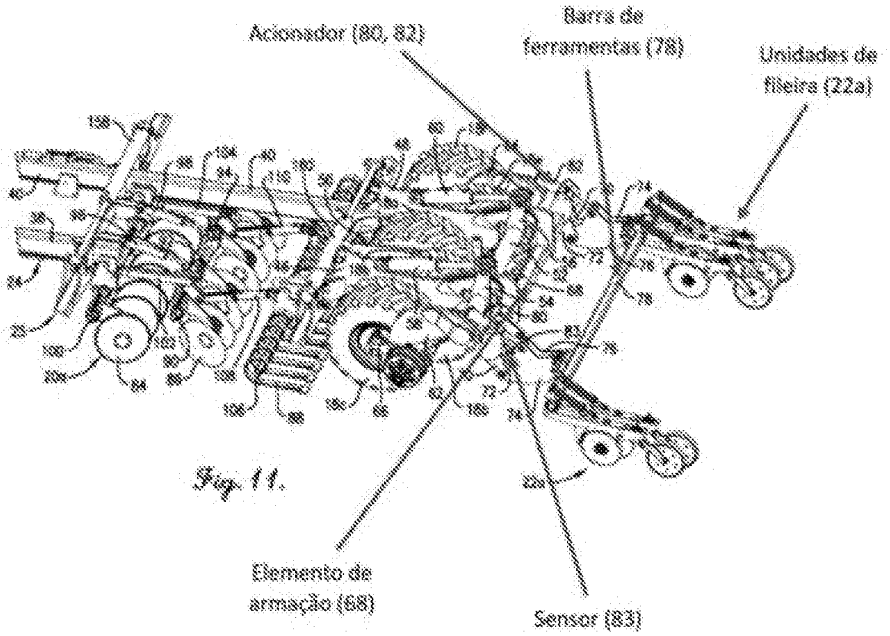


Fig. 11.

"Links 74,76 are fixed joined at their rearmost ends to a transverse toolbar 78 that supports a center gang 22a of the openers 22. A pair of hydraulic cylinders 80, 82 have their rod ends connected to links 74, 76 respectively and their base ends supported on upstanding structure fixed to transverse beam 68 for raising and lowering links 74, 76. Thus, when cylinders 80, 82 are actuated, they raise or lower the center gang of openers 22a relative to center frame section 24. For convenience, cylinders 80, 82 are hereinafter referred to as the "opener cylinders". As will be seen, opener cylinders 80, 82 are also utilized to apply down pressure to openers 22a. An opener down position sensor 83 (FIG. 11) in the nature of a proximity switch is mounted between one pair of the links 74,76 and is covered and uncovered thereby for detecting when openers 22a are in their lowered position."

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60. The **E6** seeder features an **actuator** (a hydraulic cylinder), which acts to **pivot the toolbar.** On the other hand, the sensor defined by **E6** only detects the lowered positioning of the planting rows.

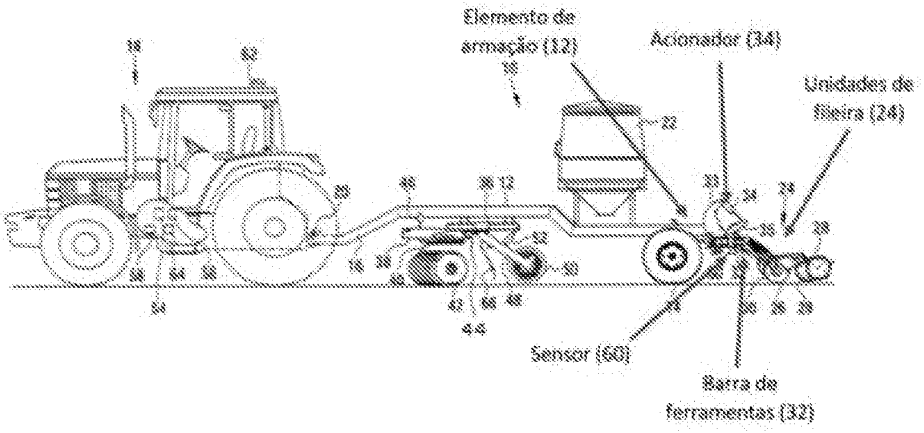
61. However, an expert on the subject, seeking to solve the inconvenience related to keeping the work tools attached to the agricultural implement at the same soil depth, and using the teachings of **E1, E2** or **E3,** would be led to change the sensor of **E6** in order to also check when the planting rows are not in a predetermined position.

62. It is clear, therefore, that the invention described in **E6** presents the **technical features** described in this patent application and solves the same technical problem presented. In this way, **the invention of the present request is anticipated by the teachings of the E6 document in combination with E1, E2 or E3.**

Document E7 - US2003024450A1

63. Document **E7** describes an **agricultural machine** equipped with a **frame** 12 to which a **toolholder** 32 is attached. a plurality of 24 **row units are** supported by 32 toolholders. **of row can pivot, and consequently adjust the depth of sowing,** through an **actuator** 34. **E7** also foresees the use of a **sensor** 60 to check the position of the actuator 34, so that the sowing depth can be adjusted by a controller 54 (see paragraphs [0018] and [0023] of E7).

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"[0018] A plurality of seeding units 24 are supported on the transversely extending tool carrier 32. These seeding units 24 are arranged side-by-side on the tool carrier 32. The tool carrier 32 is supported on and extends rearwardly from frame 12. The seeding units 24 are pivotally mounted to the tool carrier 32 so they can pivot about an axis parallel to the longitudinal axis of the tool carrier 32. The pivot angle of the seeding units 24, and thereby the sowing depth, is fixed by seeding actuator 34 in the form of a hydraulic cylinder, extending between mount 33 on frame 12 and arm 35 coupled to seeding units 24."

"[0023] […] Information about the position of actuator 34 is supplied to controller 54 via a sensor 60, so that the sowing depth of seeders 24 can be regulated by controller 54 by means of valve device 56."

64. Therefore, **E7** already anticipates an arming element: a bar of tools coupled to the frame element by means of an articulated joint;

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a row unit attached to the toolbar; and a trigger, such as described in the claim contested herein.

65. However, although the sensor described by **E7** detects the positioning of the cylinder, the applicant understands that it would be obvious to a person skilled in the art modify the configuration of such sensor, in order to detect a position of the boom of tools in relation to the ground, since, as can be seen in Figure 1 of **E7,** the sensor is attached to the toolbar.

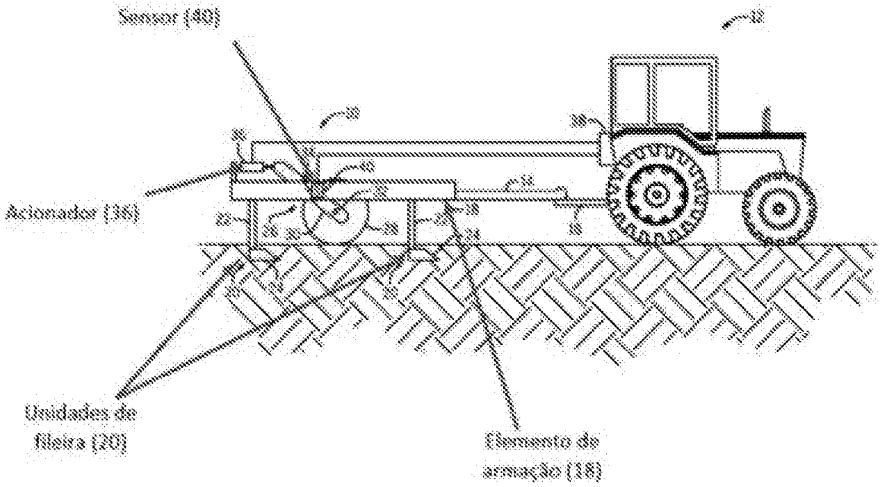
66. Also, a technician in possession of the teachings of **E1, E2** or **E3** would also be motivated to modify the **E7** sensor in order to achieve a invention such as that of the present contested application.

67. Therefore, it is clear that the invention described in **E7** presents the **technical features** described in this patent application and solves the same technical problem presented. In this way, **the invention of the present request is anticipated by the teachings of the E7 document, alone or in combination with E1, E2 or E3.**

Document E8 - US8857530B2

68. Document **E8** describes an **agricultural implement 10** that is towed by working vehicle, such as a tractor 12, and comprising a **frame of implement 18** configured to support multiple **penetration tools on the ground 20.** The implement 10 further comprises a **control cylinder of depth 36,** which is fluidly coupled to a control unit of tractor fluid 12 and a **sensor 40** arranged in the structure 18, which is coupled to tractor fluid control unit 12. Sensor 40 is configured to emit signs indicating the height of the structure in relation to the ground (see column 2, rows 43-64 and column 3, lines 19-62 of E8).

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"FIG. 1 is a side view of an exemplary agricultural implement system, including an agricultural implement 10. The implement 10 is designed to be taken behind a work vehicle, such as the illustrated tractor 12. ***[...]*** *As illustrated, the tongue assembly 14 is coupled to an implement frame 18 configured to support multiple ground engaging tools 20. In the illustrated embodiment, each ground engaging tool 20 includes a shank 22 and a tillage point 24."*

"In the illustrated embodiment, the implement 10 includes a depth control cylinder 36 extending between the frame 18 and a second end of the arm 30. The depth control cylinder 36 is fluidly coupled to a fluid control unit 38 of the tow vehicle 12, and configured to rotate the arm 30 relative to the frame 18. ***[...]*** *For example, in the illustrated embodiment, the implement 10 includes a sensor 40*

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communicatively coupled to the fluid control unit 38, and configured to output signals indicative of the frame height. The fluid control unit 38 is configured to automatically control fluid flow to the depth control cylinder based on"

"As discussed in detail below, other embodiments may include a linear potentiometer configured to measure a position of the arm 30 relative to the frame 18, a linear potentiometer configured to measure extension of a depth control cylinder rod, or a transducer (eg, ultrasonic, electromagnetic, infrared, etc.) configured to measure a height of the frame 18 above the soil surface."

69. Therefore, **E8** already anticipates a framing element; a row unit; a trigger, and a sensor configured to detect the position of the structure in to the ground, as described in the pending patent application.

70. As can be seen, the sensor described by **E8** is positioned in the element of armature, however, the applicant understands that, for a technician in the subject of possession of the teachings of **E1, E2** or **E3,** it would be obvious to modify the disposition of such a sensor, in order to place it on the toolbar and thus configure it to detect the position of the toolbar in relation to the ground, instead of height of the frame element; thus achieving an invention similar to that of the this contested application.

71. Therefore, it is clear that the invention described in **E8** presents the **technical characteristics** described in the present patent application and, thus, solves the same technical problem presented. In this way, **the invention of present application is anticipated by the teachings of the E8 document in combination with E1, E2 or E3.**

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72. Still as a way to subsidize the examination of the matter, the Applicant comes highlight that document E8, of this subsidy, was also pointed out during the examination of the APPEAL AGAINST DENIAL of the request corresponding US2020/0084951, presented by the holder AGCO. at this stage appeal, the US patent office - USPTO - KEPT THE DENIAL of the corresponding patent application US2020/0084951, considering that the object of the claim is not endowed with an inventive step compared to the previously mentioned.

VI - CONCLUSION

73. The Applicant emphasizes that the **main characteristics** claimed in the order BR112019010534-4 are included in the state of the art, when confronted with documents **D2** and **D4,** pointed out by Mr. examiner in your technical opinion, as well as documents **E1** to **E8,** alone or in combination, listed here by the Claimant.

74. The Applicant points out that, mainly **the E3 document, presents the main technical features of this application, both the framework original claim, presented at the deposit of the application, how much of the set of claims as amended in the manifestation to the opinion submitted by the holder. The combination of E1 or E2 documents with E3 it also anticipates all the technical features of this application.**

75. In addition, we emphasize that none of the dependent claims bring new material capable of conferring inventive activity on the object of invention, in view of to the documents presented here.

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76. In view of all the above, it is clear that this request of invention patent **does not meet the criteria of PATENTABILITY.** As discussed above, a person skilled in the art seeking to solve the problem of farm implements having long, stiff sections that do not operate well in uneven fields, such as depressions or plateaus that compromise the ability of ranks units to operate properly in the field, would obtain the proposed invention, in an obvious way and without any need for experimentation, based on the teachings of documents **D2, D4** and **E1** to **E8.**

That said, it clearly proves the absence of legal requirements for the granting of patent application BR112019010534-4.

In these terms, the Applicant hopes that this application will be **DENIED** invention patent, as it is a measure of **LAW** and the most legitimate **JUSTICE.**



LEANDRO DE SOUZA CARVALHO

CPF 089.419.437-28

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/470,472	**02/21/2023 03:27:08 PM ET**	**US1640/WO-US**

Title of Invention

IMPLEMENT CONTOURING TOOLBAR

Application Information

APPLICATION TYPE	Utility - U.S. National Stage under 35 USC 371	PATENT #	-
CONFIRMATION #	1653	FILED BY	Jacinta David
PATENT CENTER #	61626450	FILING DATE	06/17/2019
CUSTOMER #	88988	FIRST NAMED INVENTOR	Benjamin Anson Fanshier
INTL. APPLICATION #	-	INTL. FILING DATE	-
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Nathan Whitlock

Documents

TOTAL DOCUMENTS: 4

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
BR_OA_Jan2023_with_trans.pdf	16	Other reference-Patent/Application/Search Documents	250 KB
US1640WO-US_SuppIDS_06FEB2023.pdf	4	Information Disclosure Statement (IDS) Form (SB08)	1234 KB
Third_party_pet_with_trans_part-2.pdf	44	Other reference-Patent/Application/Search Documents	4933 KB
Third_party_pet_with_trans_p	44	Other reference-	5643 KB

art-1.pdf | Patent/Application/Search Documents

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

INSTITUTO NACIONAL DA PROPRIEDADE INDUSTRIAL

17/01/2023 870230004612 16:00

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Apresentação de subsídios ao exame técnico

Número do Processo: BR 11 2019 010534 4

Dados do Interessado

Interessado 1 de 1

Nome ou Razão Social: LEANDRO DE SOUZA CARVALHO

Tipo de Pessoa: Pessoa Fisica

CPF/CNPJ: 08941943728

Nacionalidade: Brasileira

Qualificação Física: Outras ocupações não especificadas anteriormente

Endereço: Rua São Sebastião, n°525 Bloco 11A Apto 204, São Sebastião

Cidade: Petrópolis

Estado: RJ

CEP: 25645-045

País: Brasil

Telefone:

Fax:

Email: leogargula@gmail.com

Referência Petição

Pedido : BR112019010534-4

PETICIONAMENTO ELETRÔNICO

Esta solicitação foi enviada pelo sistema Peticionamento Eletrônico em 17/01/2023 às 16:00, Petição 870230004612

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Documentos anexados

Tipo Anexo	Nome
Esclarecimento	Subsídios ao Exame.pdf
E1 US9301439B2	E1 US9301439B2.pdf
E2 -D2 US2015230391A1	E2 -D2 US2015230391A1.pdf
E5 US5065681A	E5 US5065681A.pdf
E6 US9031749B2	E6 US9031749B2.pdf
E7 US2003024450A1	E7 US2003024450A1.pdf
E8 US8857530B2	E8 US8857530B2.pdf
D4 US8573319B1	D4 US8573319B1.pdf
E4 DE102006034798B4 e tradução	E4 DE102006034798B4 e tradução.pdf
E3 - EP2335465B1	E3 - EP2335465B1.pdf
E3 - EP2335465_tradução	E3 - EP2335465_tradução.pdf

Declaração de veracidade

☑ Declaro, sob as penas da lei, que todas as informações acima prestadas são completas e verdadeiras.

PETICIONAMENTO ELETRÔNICO

Esta solicitação foi enviada pelo sistema Peticionamento Eletrônico em 17/01/2023 às 16:00, Petição 870230004612

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Pedido de Patente de Invenção: BR112019010534-4 de 23/05/2019
PCT: #PCT/IB2017/001298 de 26/10/2017
Prioridade: US #62/435,118 de 16/12/2016
Título: MAQUINÁRIO QUE CONTORNA BARRA DE FERRAMENTAS
Titular: AGCO CORPORATION

LEANDRO DE SOUZA CARVALHO, brasileiro, casado, CPF 089.419.437-28, na condição de interessado no mercado e nas tecnologias atinentes a máquinas e implementos agrícolas, vem, tempestivamente, nos termos do artigo 31 da Lei de Propriedade Industrial (LPI), apresentar

SUBSÍDIOS AO EXAME TÉCNICO

do pedido de patente de invenção **BR112019010534-4**, intitulado **"Maquinário que contorna barra de ferramentas"**, depositado em 23/05/2019 em nome de **AGCO CORPORATION**, porquanto este não atende aos requisitos de patenteabilidade, devendo ser INDEFERIDO na sua integridade, pelas razões ora trazidas ao exame.

I – DA TEMPESTIVIDADE:

1. Conforme estabelece o Artigo 31 da Lei de Propriedade Industrial Nº 9.279 de 14 de maio de 1996 (LPI), LEANDRO DE SOUZA CARVALHO vem, em legítimo interesse, apresentar documentos e informações para subsidiarem o exame da patente em questão.

> *"... Publicado o pedido de patente e até o final do exame, será facultada a apresentação, pelos interessados, de documentos e informações para subsidiarem o exame."*

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II – DO PEDIDO DE PATENTE BR112019010534-4:

2. O presente pedido diz respeito a um sistema com um elemento de armação (20), uma barra de ferramentas (22) acoplada ao dito elemento de armação por meio de uma junção articulada, estando a barra de ferramentas (22) paralela e na traseira do elemento de armação (20); unidades de fileiras acopladas à barra de ferramentas (22), um primeiro sensor (50) acoplado à barra de ferramenta (22) para detectar a posição da barra de ferramentas em relação ao chão e um acionador entre o elemento de armação (20) e a barra de ferramentas (22) para guiar a barra de ferramentas contendo as ditas unidade de fileiras em relação ao elemento de armação com base na posição da barra de ferramentas em relação ao chão, detectada pelo dito sensor.

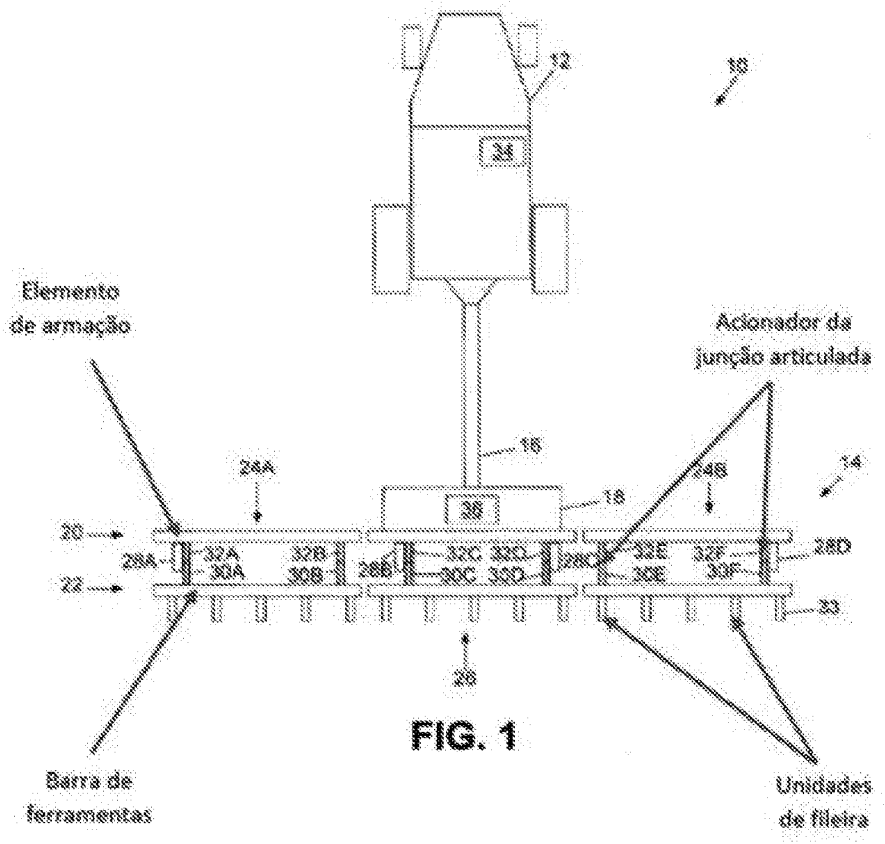


FIG. 1

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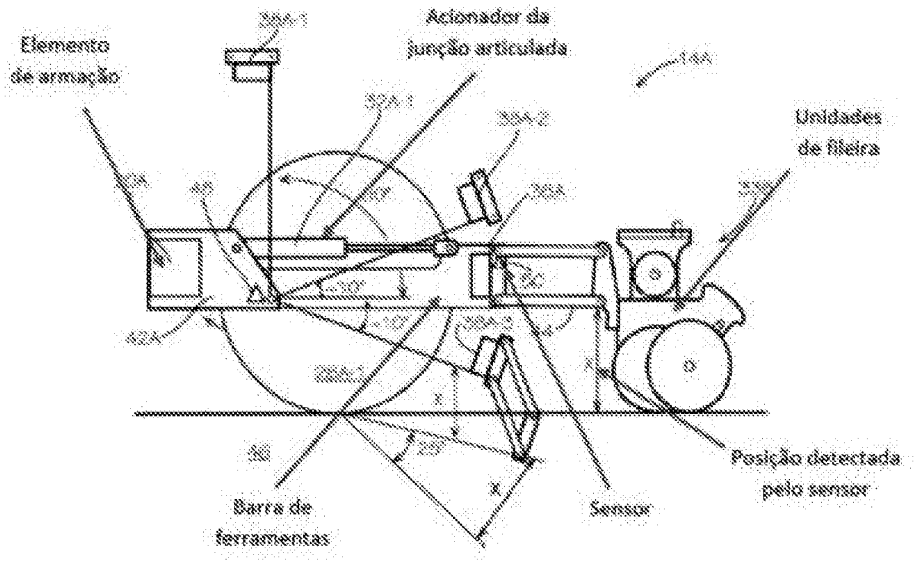


FIG. 3

III – DO HISTÓRICO DO PEDIDO:

3. O presente pedido de patente teve exigência 6.23 publicada na RPI 2644 de 08/09/2021. A Titular AGCO CORPORATION apresentou cumprimento de exigência através da petição 870210111916 de 02/12/2021, no qual emendou o quadro reivindicatório.

4. Foram apresentados também subsídios ao exame técnico por parte de terceiros, através das petições 870220004301 de 17/01/2022, com aditamento na petição 870220038309 de 03/05/2022, e 870220074436 de 18/08/2022.

5. Em seguida, o presente pedido sofreu publicação de parecer desfavorável (7.1) na RPI 2701 de 11/10/2022. Em seu parecer, o Sr. Examinador avaliou o cumprimento de exigência 6.23 apresentado pelo titular e as duas primeiras petições de subsídios, protocoladas por JIMER RAMOS DA COSTA.

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Entretanto, a terceira petição de subsídios, protocolada por LEANDRO DE SOUZA CARVALHO (atual Requerente) não foi analisada pelo referido parecer técnico do INPI.

6. Em seu parecer técnico 7.1, **o Sr. Examinador acertadamente considera que as modificações no quadro reivindicatório feitas pelo titular do pedido no cumprimento à exigência 6.23 não podiam ser aceitas, por se tratar de aumento do escopo da proteção**. Consequentemente, o quadro reivindicatório válido e analisado no parecer foi o que consta na petição de depósito do pedido.

7. Em seguida, o Sr. Examinador aponta uma série de irregularidades no presente pedido de patente e aponta os documentos US2015230391 **(D2)** e US8573319 **(D4)** como anterioridades que **antecipam o pedido de patente com relação à ATIVIDADE INVENTIVA.**

8. Por fim, por meio da petição 870230001509 de 06/01/2023, a titular do pedido AGCO CIRPORATION apresentou Manifestação ao parecer técnico, com argumentação e alterações no texto do pedido, as quais serão aqui debatidas.

9. O novo quadro reivindicatório apresentado na petição acima citada, foi reformulada conforme abaixo uma reivindicação independente, a saber:

"1. Sistema compreendendo:

um elemento de armação (20, 54) tendo rodas (28) acopladas nele;

uma barra de ferramentas (38, 56) acoplada ao elemento de armação (20, 54) por meio de uma junção articulada, a barra de ferramentas (38, 56) orientada paralela, e na traseira do, elemento de armação (20, 54);

uma unidade de fileira (33) acoplada à barra de ferramentas (38, 56); e

um acionador (32, 62) acoplado entre o elemento de armação (20, 54) e a barra de ferramentas (38, 56), o acionador (32, 62) configurado para girar a barra de ferramentas (38, 56) em relação ao elemento de armação (20, 54),

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caracterizado pelo fato de que *o sistema compreende ainda um primeiro sensor (50, 70) acoplado à barra de ferramentas (38, 56), o primeiro sensor (50, 70) configurado para detectar uma posição da barra de ferramentas (38, 56) em relação ao solo, em que a barra de ferramentas (38, 56) é girada com base em uma posição detectada da barra de ferramentas (38,56).”*

IV – DOS REQUISITOS DE PATENTEABILIDADE:

10. De acordo com a Lei de Propriedade Industrial Nº 9.279 de 14 de maio de 1996 (LPI), Artigo 8º, *“É patenteável a invenção que atenda aos requisitos de novidade, atividade inventiva e aplicação industrial.”.*

11. Para fins desta lei, a invenção é dotada de novidade quando não compreendida no estado da técnica, conforme estabelece o seu Artigo 11º e de atividade inventiva sempre que, para um técnico no assunto, não decorra de maneira evidente ou óbvia do estado da técnica, conforme o seu Artigo 13º.

12. Isto posto, o Requerente vem esclarecer que o pedido em questão, no mínimo, NÃO ENVOLVE ATIVIDADE INVENTIVA frente ao estado da técnica conhecido à época de seu depósito. Portanto, o presente pedido patente de invenção não atende ao disposto nos Artigos 8º c/c 13º da LPI, conforme se depreenderá da análise dos documentos ora trazidos, os quais impedem a concessão do pedido aqui em voga.

V – DA ATIVIDADE INVENTIVA:

13. Em sua resposta ao parecer 7.1, a titular do pedido de patente afirma que **D2** divulga um sistema com um elemento de armação e unidades de fileira na figura 4, mas não revela uma barra de ferramentas acoplada à estrutura por meio de uma junção articulada, nem um acionador configurado para girar a barra de

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ferramentas. Em particular, as unidades de fileira são conectadas diretamente à estrutura do implemento 34.

14. Entretanto, o parágrafo [0028] de **D2** revela que cada um dos conjuntos de linha de sementes (36) inclui **um acessório de engate no solo ou unidade de linha de cultivo (52) acoplado a uma estrutura rígida** (53) por uma **primeira articulação (54) operacionalmente em torno de um pivô** (55), a estrutura rígida (53) dependendo da estrutura do implemento (34).

15. O parágrafo [0055] de **D2** revela que a articulação de ligação (252) segue a rotação da primeira articulação (54) de modo que o tirante (256) faz com que o braço de alavanca (228) gire no sentido horário (274) em um ângulo +θ1 em relação à porção de base (224) do sensor de posição (220).

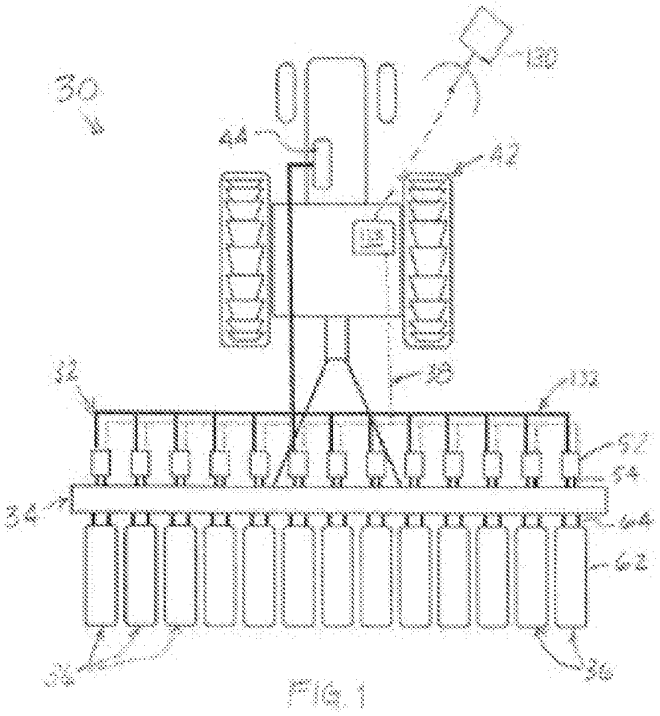


FIG. 1

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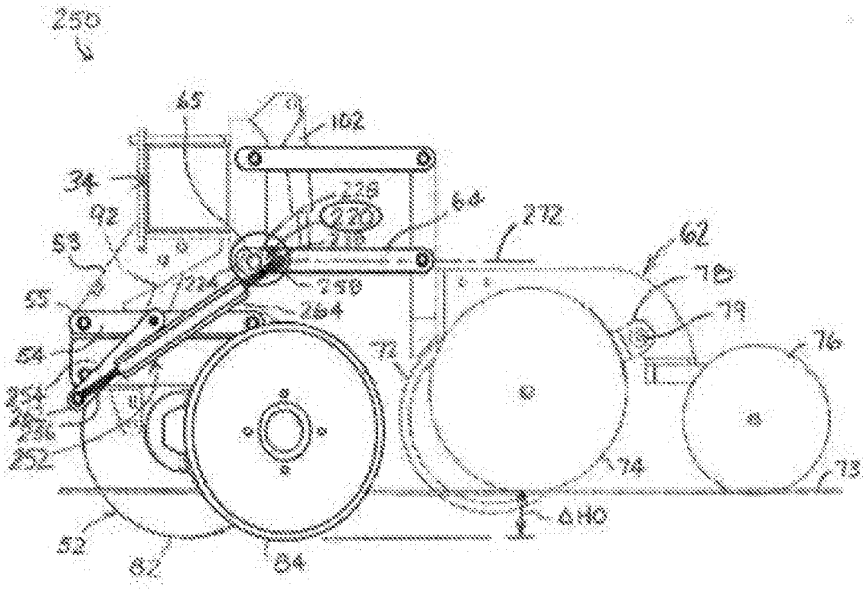


FIG. 8A

16. **D2** também já descreve no parágrafo [0033] que cada unidade de plantio 36 ainda compreende os sensores de posição 112 e 114 nas articulações 54 e 64 das unidades de plantio 36, para detectar a posição a rotação angular das respectivas articulações.

[0033] Each of the seeding row assemblies **36** can further comprise a position sensing module **110**. In certain embodiments, the position sensing module **110** includes position sensors **112** and **114** operatively coupled to the first linkage **54** and the second linkage **64**, respectively, that output signals **116** and **118**, respectively, corresponding to the sensed position. The position sensors **112** and **114** are arranged to detect an angular rotation of the respective linkages **54** and **64** about their respective pivots **55** and **65**, as depicted herein, for example by a rotating potentiometer. In other embodiments, position sensing can be provided by magnetostrictive sensors or linear sliding devices, such as sliding potentiometers or linear variable differential transformers (LVDT). One embodiment of the position sensors **112**, **114** is discussed below attendant to FIG. **7**.

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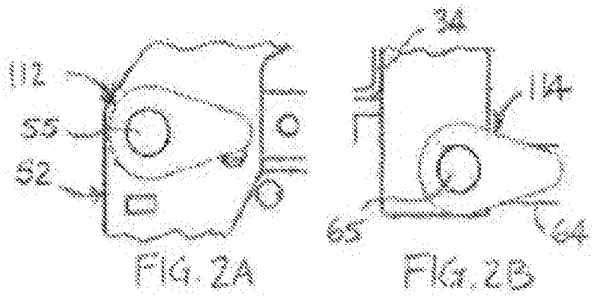


FIG. 2A FIG. 2B

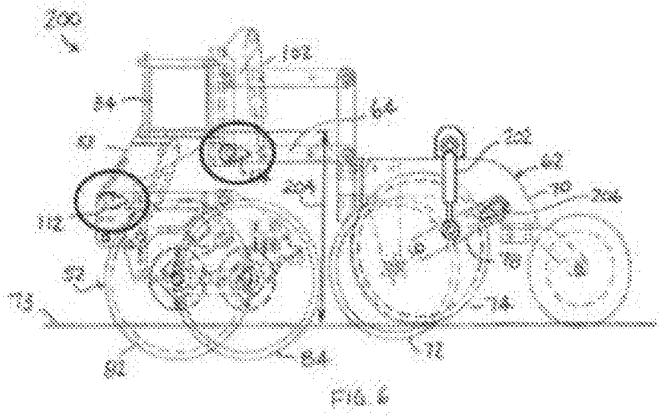


FIG. 6

17. Então podemos observar que D2 antecipa o acionador de junção articulada entre a armação do implemento e a barra de ferramentas. **D2** apresenta um **atuador**, tal como um cilindro hidráulico, que atua para **pivotar a barra de ferramentas com base na posição detectada por sensores de posição em relação ao solo**. Resta claro que **D2** apresenta características técnicas descritas no presente pedido de patente.

18. Em sua resposta ao parecer 7.1, a titular do pedido afirma também que o presente parecer lista a terceira seção de **D4** como a barra de ferramentas da reivindicação 1 sem explicar por que ou como essa seção de estrutura poderia ser utilizada no sistema de **D2**. A titular entende que não há qualquer razão para fazer tal modificação em **D2**.

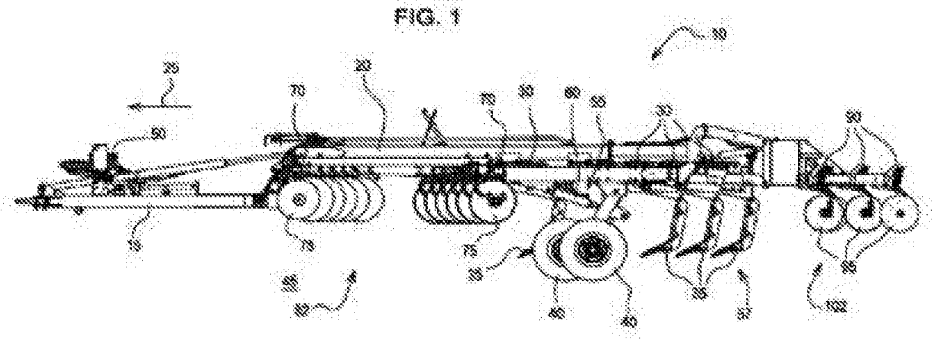
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19. Entretanto, o Requerente aponta que um técnico no assunto poderia utilizar a terceira seção de **D4** em paralelo ou na traseira do elemento de armação de **D2**, desta forma a combinação de **D4** e **D2** antecipa as características da reivindicação 1 do presente pedido de patente.

20. Ademais, o documento **D4** apresenta um sistema de controle para um implemento agrícola que inclui um **sensor de posição** configurado para medir uma indicação de profundidade de uma profundidade operacional real de uma ferramenta de engajamento no solo e configurado para gerar um sinal de posição correspondente. O sistema inclui também um **sensor de pressão** configurado para medir uma indicação de pressão de uma pressão operacional real e configurado para gerar um sinal de pressão correspondente.

21. **D4** descreve também uma **unidade de controle de implemento** configurada para receber o sinal de posição e o sinal de pressão e configurada para controlar um dispositivo de ajuste de modo que a indicação de profundidade almeje um ponto de ajuste de profundidade que é indicativo da profundidade operacional pré-selecionada, desde que a indicação de pressão esteja dentro de um préintervalo de pressão selecionado.

FIG. 1



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22. Além disso, em **D4**, o ponto de articulação de onde o atuador está conectado (veja a Figura 1 de **D4** abaixo), fornece rotação da barra de ferramentas durante a atuação do atuador. Portanto, a barra de ferramentas gira em relação à estrutura (ligação) como mostrado no movimento dos pontos de articulação em fig. 1 a fig. 2 de **D4**, que possuem um ponto de articulação em relação ao elemento de armação que permite o levantamento da barra de ferramentas.

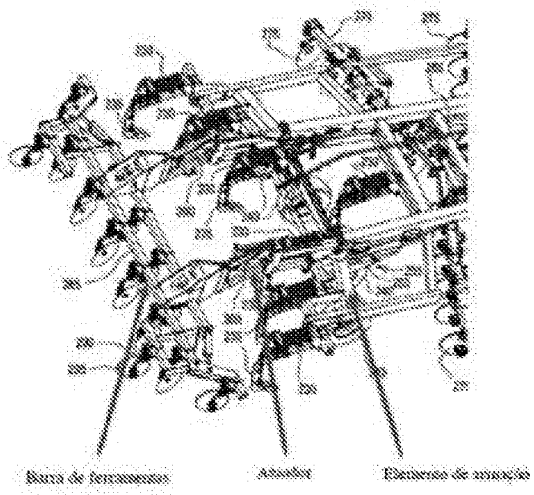


Fig. 10 de D4: desenho com comentários

23. O documento **D4,** em sua reivindicação 1, antecipa o presente pedido em um sistema de controle que compreende: **um sensor de posição configurado para medir uma indicação de profundidade operacional real da ferramenta de engate no solo e configurado para gerar um sinal de posição.**

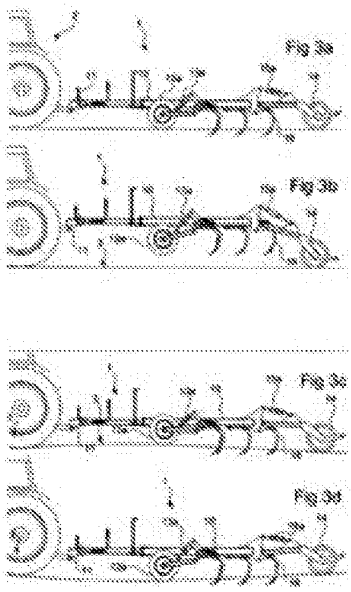
24. Adicionalmente, o Requerente reitera os argumentos apresentados previamente através da petição 870220074436 de 18/08/2022, que ainda não foram considerados pelo Sr. Examinador em seu parecer de ciência 7.1.

25. O Requerente apresentou em seus subsídios 8 documentos de anterioridade, então identificados como D1 a D8. Nesta oportunidade, o

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Requerente identifica os mesmos documentos como E1 a E8 para facilitar o entendimento. O documento D2 previamente citado é o mesmo que E2. Os documentos E1 a E8 são reapresentados abaixo:

E1: US9301439B2 – Agricultural implement and method for controlling an agricultural implement – publicado em 05/04/2016.

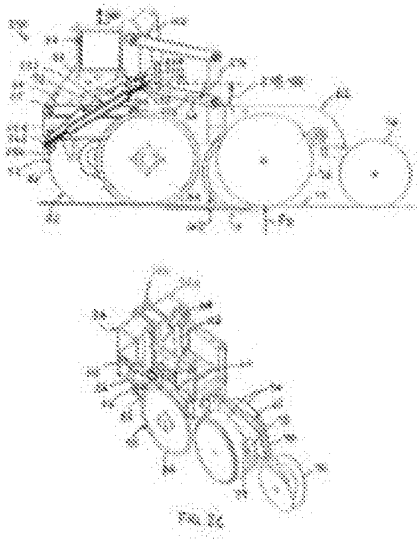


E1 refere-se a um implemento agrícola para trabalhar o solo, autopropelido ou rebocado, compreendendo uma estrutura, primeira e segunda unidades de manutenção de profundidade que compreendem primeiro e segundo atuadores hidráulicos para ajustar a altura das primeira e segunda unidades de manutenção de profundidade em relação à estrutura, respectivamente, e pelo menos uma ferramenta de trabalho de engate com o solo. Os primeiro e segundo atuadores hidráulicos são conectados a válvulas que suprem fluido hidráulico ao sistema. Um primeiro lado do primeiro atuador hidráulico se comunica com um primeiro lado do segundo atuador hidráulico e um mecanismo de medição configurado para fornecer um valor medido correspondente a uma primeira quantidade de fluido hidráulico ocorrendo nos referidos primeiros lados.

E2: US2015230391A1 - Depth control for a seed planting system – publicado em 20/08/2015.

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E2 refere-se a um sistema de plantio que inclui uma pluralidade de conjuntos de linha de semeadura, cada um compreendendo componentes que são mantidos a uma elevação controlada. O conjunto de linha de semeadura inclui uma unidade de linha de cultivo controlada para manter uma elevação desejada em relação a uma unidade de linha de semeadura. Cada conjunto de linha de semeadura pode incluir dois sensores de posição que geram sinais correspondentes à elevação da unidade de linha de semeadura e ao anexo de engate no solo, respectivamente, ou um sensor de posição diferencial que gera sinais correspondentes à diferença nas elevações. Várias modalidades incluem um controlador de circuito fechado local que ajusta a elevação da unidade de linha de cultivo em relação à unidade de linha de semeadura para um ponto de ajuste desejado. Em algumas modalidades, a força descendente da unidade de linha de semeadura é ativamente controlada.



E3: EP2335465B1 – Agricultural machine – publicado em 23/05/2012.

E3 refere-se a uma máquina agrícola, particularmente uma semeadora, compreendendo uma estrutura de máquina e um elemento sensor que é fixado a um elemento de trabalho do solo para detecção da deflexão dos elementos de trabalho do solo contra uma estrutura de suporte. Um computador

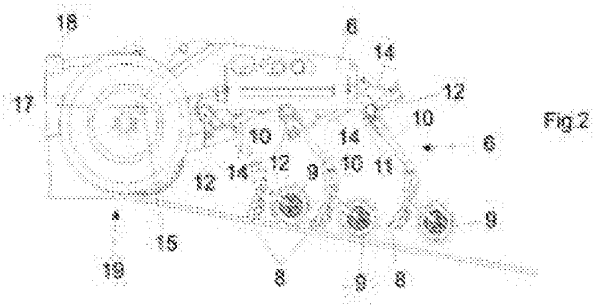


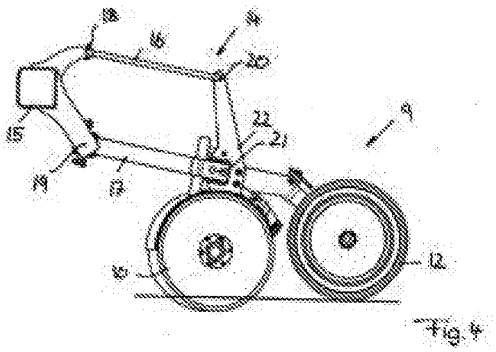
Fig 2

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de bordo é acoplado à máquina agrícola, onde o elemento sensor transmite os sinais para o computador de bordo.

E4: DE102006034798B4 – Agricultural machine i.e. semi-trailed seeder, for working on e.g. planar ground, has quadruplet articulation provided such that transversal support that makes rotary movement, during ascending movements of articulation - publicado em 13/02/22014.

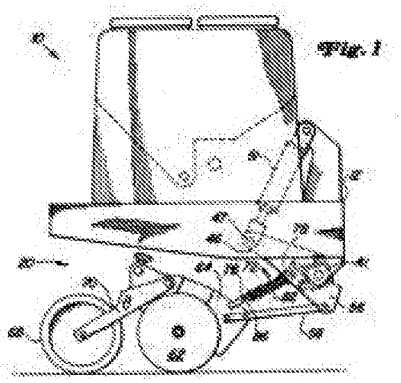
E4 refere-se a uma máquina, por exemplo, uma semeadora, que possui uma articulação quádrupla proporcionada de tal forma que um suporte transversal faz um movimento de rotação, durante os movimentos ascendentes da articulação. O movimento rotativo do suporte proporciona, em uma posição de operação, em uma região de uma unidade de trabalho distante de um mecanismo de rolamento, um movimento ascendente mais tensionado do que em outra região da unidade, onde esta última região está mais distante do mecanismo. Os pontos de articulação são espaçados entre si por uma pequena distância.



E5: US5065681A – Hydraulic down pressure structure for an implement with multiple ground engaging tools – publicado em 19/11/1991.

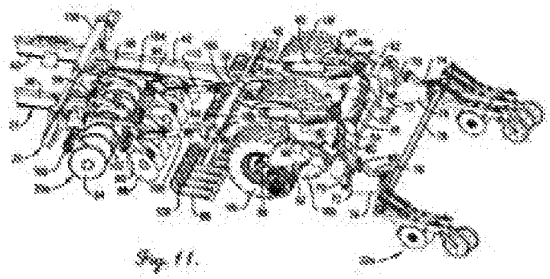
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E5 refere-se a um arranjo de pressão descendente aprimorado para um implemento, tal como uma semeadora com linhas de várias seções, com estruturas de seção de altura fixa com grupos correspondentes de conjuntos de abridor. Os conjuntos de abridor de cada grupo são inclinados para baixo de forma flexível por uma estrutura de mola e suporte operativamente conectada a um virabrequim. Um virabrequim por grupo é fornecido e cada virabrequim é controlado por um único cilindro de ajuste de pressão descendente. Os cilindros são conectados em paralelo e a um regulador de pressão para fornecer pressão descendente média ajustável e uniforme ao abridor em condições irregulares do solo. Os elos de tensão conectados à estrutura do suporte permitem que os conjuntos do abridor sejam elevados de uma posição de trabalho no solo para uma posição de transporte.



E6: US9031749B2 – Cultivation air seeder having sequentially operated tools – publicado em 12/052015.

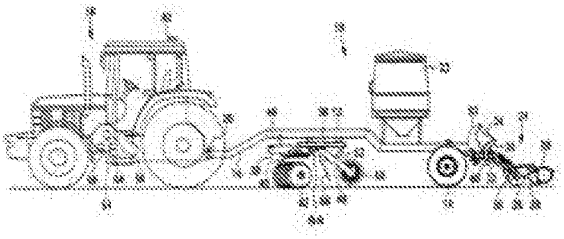
E6 refere-se a uma semeadora dotada de um dosador para dispensar sementes de uma tremonha a uma taxa medida quando o dosador é ativado. Abridores de sulco são fornecidos atrás dos cultivadores para preparar sulcos, que receberão sementes provenientes da tremonha quando os abridores estão engatando no solo; em que os abridores são seletivamente eleváveis de uma posição abaixada de engate com o solo para uma posição elevada em que os abridores não entram em contato com



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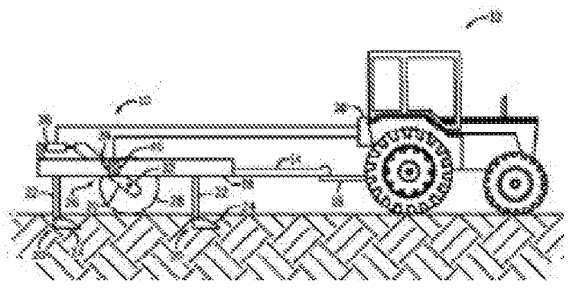
o solo. Um sistema de operação e controle desativa o dosador e eleva os cultivadores e os abridores em uma sequência predeterminada.

E7: US20030024450A1 – Controller for a cultivating and seeding machine – publicado em 06/02/2003.



E7 refere-se a uma máquina de cultivo e semeadura fornecida com uma unidade de semeadura e um dispositivo de lavoura e/ou um rolo de terra. A unidade de semeadura é fornecida com um atuador de semeadura, o dispositivo de lavoura é fornecido com um atuador de lavoura e o rolo de terra é fornecido com um atuador de rolo de terra. O atuador de semeadura regula a profundidade de semeadura da unidade de semeadura, enquanto os atuadores de lavoura e rolo de terra regulam a pressão descendente desses dois implementos, respectivamente. Um controlador que possui uma memória carregada com informações para ajustar os implementos de trabalho, controla os vários atuadores em resposta a esses registros de dados.

E8: US8857530B2 – Automatic depth control system for an agricultural implement – publicado em 13/09/2012.



E8 refere-se a um sistema de implemento agrícola que inclui um implemento e uma unidade de controle de fluido configurada para ser acoplada a um veículo de reboque. O sistema de

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implemento agrícola também inclui um cilindro de controle de profundidade disposto em um chassi do implemento e acoplado de forma fluida à unidade de controle de fluido. O cilindro de controle de profundidade é configurado para ajustar a profundidade de penetração de uma ferramenta de penetração no solo do implemento através da variação da altura de um conjunto de disco de engate no solo. Além disso, o sistema de implemento agrícola inclui um sensor acoplado comunicativamente à unidade de controle de fluido e configurado para emitir sinais indicativos da profundidade de penetração da ferramenta de penetração no solo. A unidade de controle de fluido é configurada para controlar automaticamente o fluxo de fluido para o cilindro de controle de profundidade com base nos sinais enviados pelo sensor para manter uma profundidade de penetração selecionada pelo usuário.

26. De acordo com o art. 5º, itens I e II da Instrução Normativa nº 30, as **Reivindicações Independentes devem proteger as características técnicas essenciais à realização da invenção**.

> **Art. 5º** As reivindicações independentes deverão cumprir as seguintes especificações:
>
> I. as reivindicações independentes visam a proteção de características técnicas essenciais e específicas da invenção em seu conceito integral, cabendo a cada categoria de reivindicação pelo menos uma reivindicação independente;
>
> II. cada reivindicação independente deve corresponder a um determinado conjunto de características essenciais à realização da invenção, sendo que somente será admitida mais de uma reivindicação independente da mesma categoria se tais reivindicações definirem diferentes conjuntos de características alternativas e essenciais à realização da invenção, ligadas pelo mesmo conceito inventivo.

27. Conforme apontado anteriormente, o novo quadro reivindicatório apresentado possui uma reivindicação independente, a saber:

"1. Sistema compreendendo:

um elemento de armação (20, 54) tendo rodas (28) acopladas nele;

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uma barra de ferramentas (38, 56) acoplada ao elemento de armação (20, 54) por meio de uma junção articulada, a barra de ferramentas (38, 56) orientada paralela, e na traseira do, elemento de armação (20, 54);

uma unidade de fileira (33) acoplada à barra de ferramentas (38, 56); e

um acionador (32, 62) acoplado entre o elemento de armação (20, 54) e a barra de ferramentas (38, 56), o acionador (32, 62) configurado para girar a barra de ferramentas (38, 56) em relação ao elemento de armação (20, 54),

***caracterizado pelo fato de que** o sistema compreende ainda um primeiro sensor (50, 70) acoplado à barra de ferramentas (38, 56), o primeiro sensor (50, 70) configurado para detectar uma posição da barra de ferramentas (38, 56) em relação ao solo, em que a barra de ferramentas (38, 56) é girada com base em uma posição detectada da barra de ferramentas (38,56).”*

28. Desta forma, conforme estabelecido pela normativa, o presente pedido conforme emendado trata de <u>um sistema,</u> que compreende as seguintes **<u>CARACTERÍSTICAS TÉCNICAS ESSENCIAIS</u>**:

I) *um primeiro sensor (50, 70) acoplado à barra de ferramentas (38, 56), o primeiro sensor (50, 70) configurado para detectar uma posição da barra de ferramentas (38, 56) em relação ao solo, em que a barra de ferramentas (38, 56) é girada com base em uma posição detectada da barra de ferramentas (38,56)*

29. Analisando as características técnicas essenciais frente ao estado da técnica, temos:

<u>Documento E1 – US9301439B2</u>

30. **E1** descreve implementos agrícolas para trabalho conectado ao solo, em que se deseja manter a profundidade de trabalho das ferramentas de trabalho

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acopladas ao implemento, a uma profundidade uniforme (ver coluna 1, linhas 65-67 de **E1**).

SUMMARY OF THE INVENTION

An object is therefore to provide an improved system for as adjusting the working depth or height of an agricultural implement.

31. Portanto, **E1** propõe uma solução para o mesmo problema técnico que o presente pedido busca sanar, conforme descrito no parágrafo [002] do relatório descritivo do presente pedido, a saber, manter as ferramentas de trabalho acopladas ao implemento agrícola a uma mesma profundidade do solo, mesmo quando o implemento se desloca sobre um terreno com planaltos ou voçorocas.

32. Para tanto, a invenção de **E1** prevê um sistema hidráulico compreendendo **atuadores hidráulicos** (13 e 15) controlados por uma **unidade de controle** (20), em resposta aos sinais gerados pelos **sensores de posição** (18, 19). Os ditos **sensores de posição** (18, 19) podem ser sensores de ângulo dispostos em um ou ambos os cilindros hidráulicos (13 e 15).

33. As figuras 4 a 7 de **E1** referem-se ao uso de um sistema hidráulico em uma semeadeira de precisão, em que cilindros hidráulicos (113) são dispostos entre a viga transversal (110) da estrutura do implemento e as unidades de plantio (116) e são controlados por sensores de posição (118, 119).

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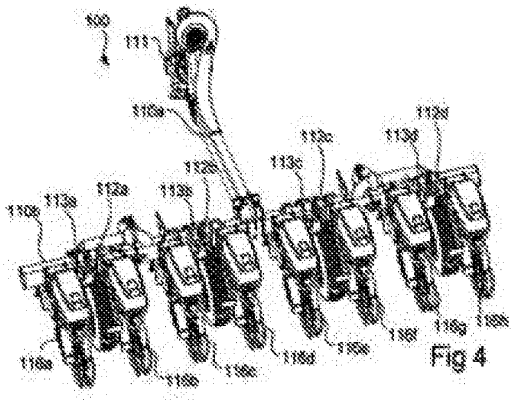


Fig 4

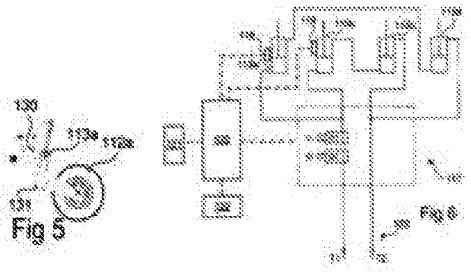


Fig 5

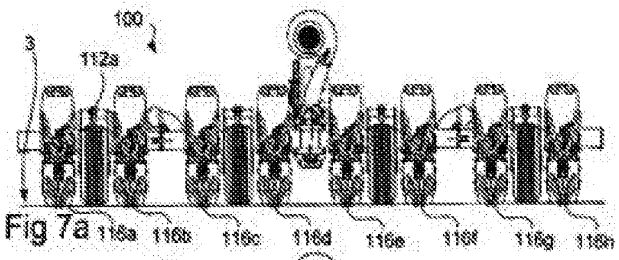


Fig 7a

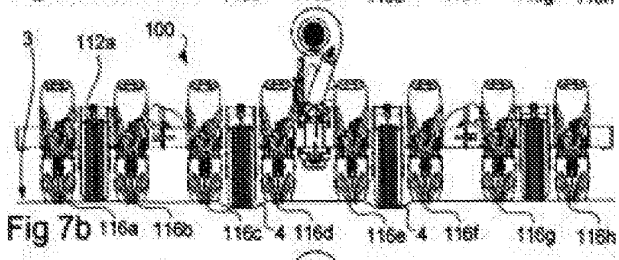


Fig 7b

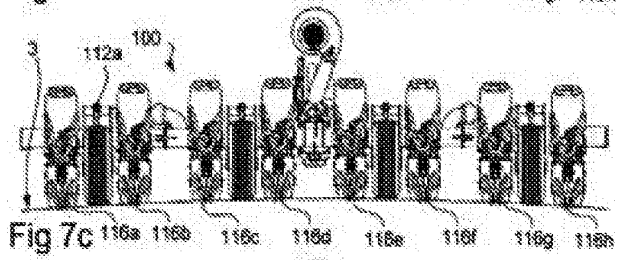


Fig 7c

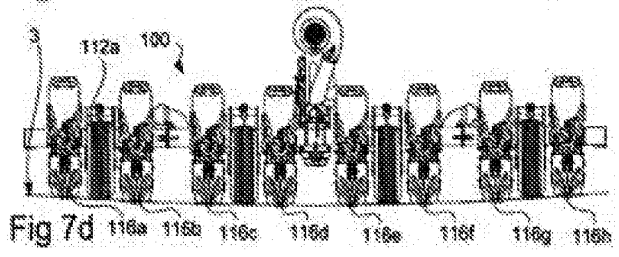


Fig 7d

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34. Portanto, assim como no pedido de patente ora em análise, **E1** já ensina prover um **sistema** para implementos agrícolas, em que a barra de ferramentas é controlada por meio de acionadores hidráulico que respondem às posições detectadas por **sensores** de posição.

35. Isto posto, resta claro que a invenção descrita em **E1** apresenta as **características técnicas** descritas no presente pedido de patente e soluciona o mesmo problema técnico apresentado. Desta forma, **a invenção do presente pedido é antecipada pelos ensinamentos do documento E1.**

Documento E2 – US2015230391A1

36. O documento **E2** descreve um sistema de plantio que inclui uma pluralidade de conjuntos de linha de semeadura, cada uma tendo componentes mantidos em uma elevação controlada (vide parágrafos [040] a [061]).

37. O requerente entende que **E2** apresenta **uma armação rígida (53) que acopla tanto uma unidade de linha de cultivo (52) de modo pivotante quanto uma barra de ferramentas (34), a qual uma pluralidade de unidades de fileira de plantio (62) é acoplada à barra de ferramentas**.

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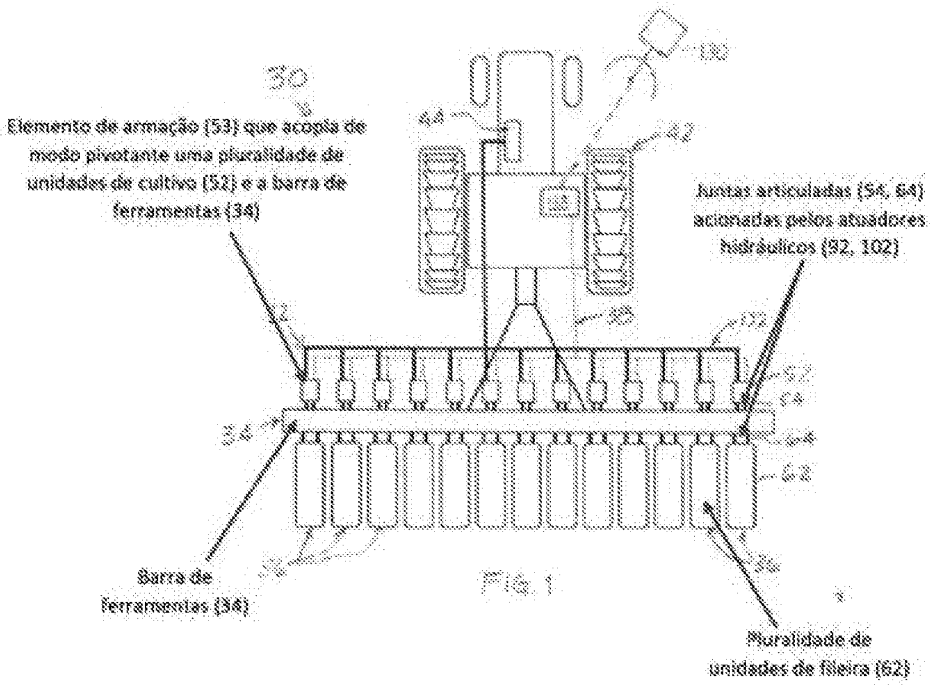


Fig. 1

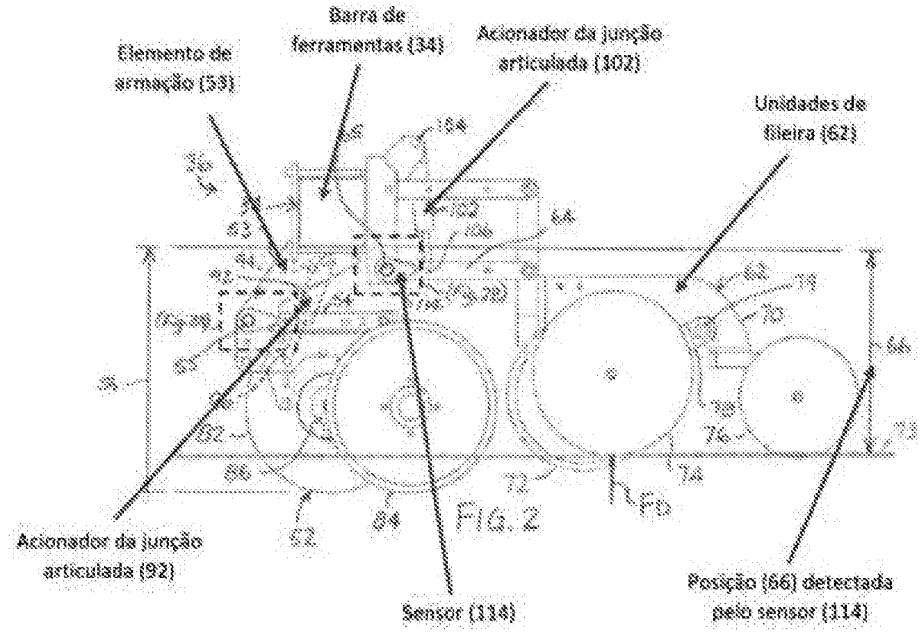


Fig. 2

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38. De acordo com **E2**, o sistema revelado pode incluir um atuador de linha de cultivo (92) operacionalmente acoplado entre a barra (34) do implemento e a unidade de fileira de cultivo (52) ou conexão (54), para ajustar a elevação (56) da unidade de fileira de cultivo (52) em relação à barra (34), em que a dita unidade de fileira de cultivo (52) está acoplada à armação do implemento (53).

> *"[0028] Each of the seed row assemblies 36 includes a ground engaging attachment or tillage row unit 52 coupled to a rigid frame 53 by a first linkage 54 operatively about a pivot 55, the rigid frame 53 depending from the implement frame 34."*
>
> *"[0030] Each of the seed row assemblies 36 can further include a tillage row actuator 92 operatively coupled between the implement frame 34 and the tillage row unit 52 or linkage 54, the tillage row actuator 92 including a base portion 94 and a free portion 96, the free portion 96 being translatable relative to the base portion and being operatively coupled with the tillage row unit 52 for adjustment of the elevation 56 of the tillage row unit 52 relative to the implement frame 34."*

39. Logo, apesar de a invenção de **E2** diferir do presente pedido por compreender um segundo acionador de junção articulada entre a unidade de fileira de semeadura (62) e a barra de ferramentas (34), este **já antecipa o acionador de junção articulada entre a armação (53) do implemento e a barra de ferramentas (34).**

40. No parágrafo [0033] de **E2,** também é descrito que cada um dos conjuntos de linha de semeadura 36 pode ainda compreender um módulo de detecção de posição 110. Em certas modalidades, o módulo de detecção de posição 110 inclui

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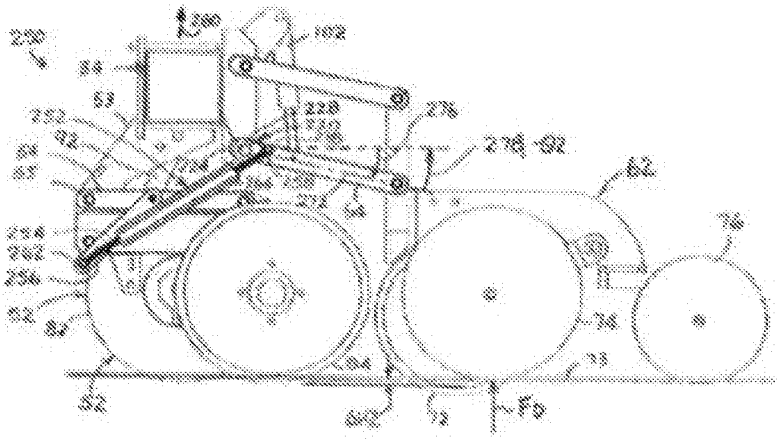
sensores de posição 112 e 114 operativamente acoplados à primeira conexão 54 e à segunda conexão 64, respectivamente, que emitem sinais 116 e 118, respectivamente, correspondendo à posição detectada. Os sensores de posição 112 e 114 são dispostos para detectar uma rotação angular das respectivas conexões 54 e 64 sobre seus respectivos pivôs 55 e 65, conforme representado neste documento, por exemplo por um potenciômetro giratório.

[0033] Each of the seeding row assemblies **36** can further comprise a position sensing module **110**. In certain embodiments, the position sensing module **110** includes position sensors **112** and **114** operatively coupled to the first linkage **54** and the second linkage **64**, respectively, that output signals **116** and **118**, respectively, corresponding to the sensed position. The position sensors **112** and **114** are arranged to detect an angular rotation of the respective linkages **54** and **64** about their respective pivots **55** and **65**, as depicted herein, for example by a rotating potentiometer. In other embodiments, position sensing can be provided by magnetostrictive sensors or linear sliding devices, such as sliding potentiometers or linear variable differential transformers (LVDT). One embodiment of the position sensors **112**, **114** is discussed below attendant to FIG. **7**.

41. O parágrafo [0035] de **E2** descreve que em uma modalidade, os atuadores 92 e 102 são cilindros hidráulicos lineares (conforme representado), que são operativamente acoplados a um circuito de pressão hidráulica 132 que é proveniente, por exemplo, da fonte de pressão hidráulica 44 da unidade de reboque 42. O circuito de pressão hidráulica pode incluir linhas de origem 134 e linhas de retorno 136. Outros tipos de atuadores podem também ser implementados, como atuadores hidráulicos rotacionais, atuadores pneumáticos lineares ou rotacionais e/ou atuadores lineares ou rotacionais movidos por um motor elétrico. Em algumas modalidades, todos os atuadores são do mesmo tipo; outras modalidades utilizam uma mistura de tipos de atuadores.

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[0035] In one embodiment, the actuators **92** and **182** are linear hydraulic cylinders (as depicted), which are operatively coupled with a hydraulic pressure circuit **132** that is sourced, for example, the hydraulic pressure source **44** of the towing unit **42**. The hydraulic pressure circuit can include source lines **134** and return lines **136**. Other type actuators can also be implemented, such as rotational hydraulic actuators, linear or rotational pneumatic actuators, and/or linear or rotational actuators powered by an electric motor. In some embodiments, all actuators are of the same type; other embodiments utilize a mix of actuator types.



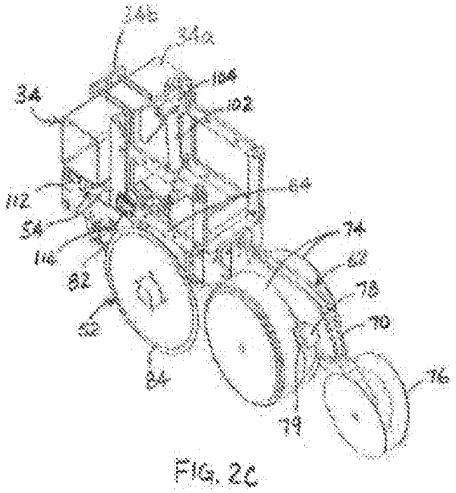


FIG. 2C

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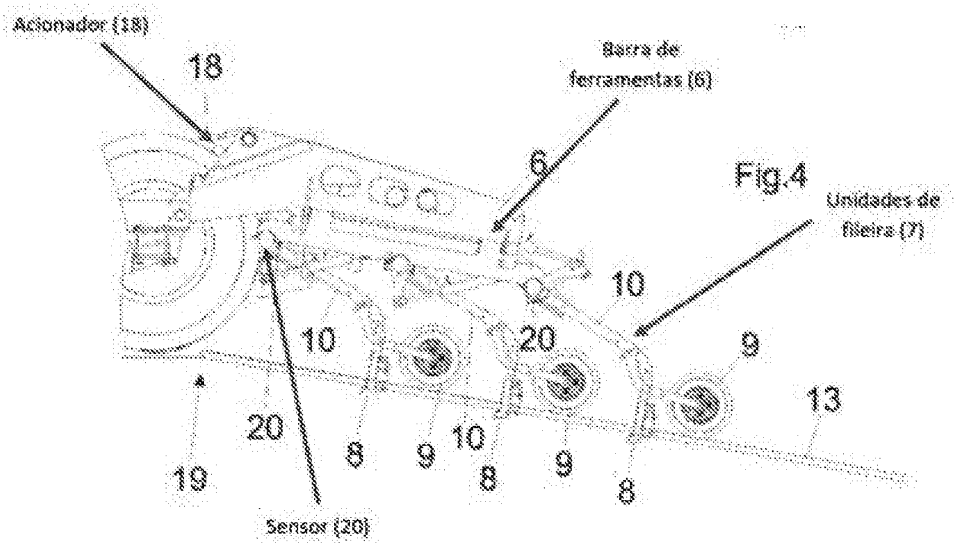
42. Portanto, o sistema de plantio descrito em **E2** apresenta um **atuador**, tal como um cilindro hidráulico, que atua para **pivotar a barra de ferramentas com base na posição detectada por sensores de posição em relação ao solo**. O sensor de posição (112) está acoplado à primeira conexão (54) da estrutura (34) e o sensor de posição (114) está acoplado à segunda conexão (64) da estrutura da unidade de linha (52), assim como descrito no pedido aqui contestado.

43. Resta claro que a invenção descrita em **E2** apresenta as **características técnicas** descritas no presente pedido de patente e soluciona o mesmo problema técnico apresentado. Desta forma, **a invenção do presente pedido é antecipada pelos ensinamentos do documento E2.**

Documento E3 - EP2335465

44. Especial destaque deve-se dar ao documento **E3**, o qual descreve uma máquina agrícola compreendendo uma estrutura de máquina suportada por um chassi; uma **estrutura de suporte** na qual **uma linha de plantio** é acoplada; um **cilindro hidráulico** é provido entre a estrutura de suporte e a estrutura de máquina; um **elemento sensor** é disposto na linha de plantio e é conectado a um computador de bordo, de forma que, de acordo com os sinais enviados pelo sensor, **o cilindro hidráulico movimenta a estrutura de suporte para manter a deflexão das linhas de plantio aproximadamente iguais** (vide parágrafos [008] a [013] de **E3**).

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"[0009] On the back of the machine frame 1, a support frame 6 is arranged. A working unit 7 is arranged on this support frame 6. The working unit 7 comprises soil cultivation elements designed as sowing coulters 8 with associated depth control and/or pressure rollers 9." (tradução livre)

"[0012] In order to remedy this situation, the support frame 6 must be pivoted about the pivot axis 17 running through the joint arrangement 15 by means of the hydraulic cylinder 18, as shown in FIGS. 3 and 4. After pivoting, the support frame 6 is parallel to the soil surface 13 to be processed, so that all coulters 8 penetrate the soil 13 to the same depth and the rollers 9 are pressed against the soil 13 by the spring force. (tradução livre)

[0013] In order to achieve this automatically, a sensor element 20 for detecting the deflection of the holding arm 10 of the soil cultivation element 8 relative to the support frame 6 is assigned to one soil cultivation element 8 of the front transverse row and the

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rear transverse row. This sensor 20 sends signals and data to an on-board computer 21 arranged on the tractor 5. An evaluation program is stored in the memory of on-board computer 21, by means of which the control elements of motorized actuating device 18 are actuated by on-board computer 21 in such a way that, by pivoting support frame 6 using actuating device 18, the deflection of soil tillage elements 8 in the first transverse row is at least approximately equal to the deflection of soil cultivation elements 8 of the rear transverse row relative to the support frame 6, as shown in FIGS. 3 and 4 show. By means of this evaluation program of the on-board computer 21 and the detection of the position of the holding arms 10 of the soil tillage elements 8 relative to the support frame 6, the position of the support frame 6 relative to the soil tillage elements 8 and thus to the contour of the soil surface 13 can be adjusted during the entire tillage process and the deflection of the soil tillage elements 8 of the rear transverse row compared to the support frame 6 and the deflection of the soil working elements 8 compared to the first transverse row at least approximately the same and to keep. Thus, a uniform penetration depth of the tillage elements 8 or the seed coulters into the soil 13 is achieved."
(tradução livre)

45. Conforme pode ser visto na Figura 3 (abaixo) do pedido de patente em análise, o sensor está disposto na articulação da unidade de fileiras, logo, **resta claro que o sensor do pedido de patente em questão está disposto no mesmo local do sensor descrito em E3**. Note-se, ainda, que no presente pedido de patente, a Depositante descreveu as características do sistema de forma diferente do usualmente utilizado pelos técnicos no assunto deste campo técnico.

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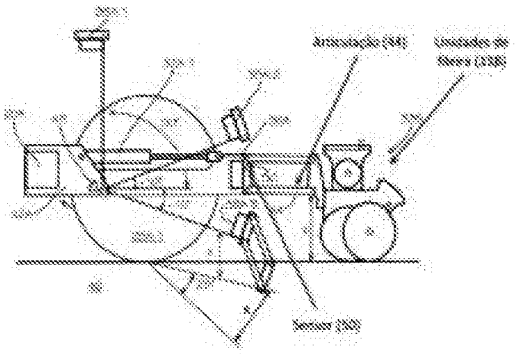


FIG. 3

46. Além disso, o Requerente entende que o local onde o sensor está disposto é uma mera escolha de design e não gera vantagens a invenção em análise. O relatório descritivo do pedido de patente em análise corrobora para este entendimento, visto que o parágrafo **[027]** também revela que para permitir que a barra de ferramentas siga o contorno do campo, informações são recebidas de um sensor sobre a posição relativa da barra de ferramentas e, por extensão, a posição relativa da unidade de fileiras em relação ao chão. Ou seja, o local onde o sensor está disposto, seja na barra de ferramentas, seja na unidade de fileiras, não interfere no resultado alcançado pela invenção.

> para todas as unidades de fileiras 33B. Em geral, para permitir que a barra de ferramentas 38A (e consequentemente, a barra de ferramentas 38A) siga o contorno do campo, são recebidas informações de sensor sobre a posição (relativa) da barra de ferramentas 38A (e por extensão, a posição relativa da unidade de fileiras 33B) em relação ao chão. Um

47. Assim, ainda que a Depositante do presente pedido de patente alegue que o sensor está disposto em um local diferente do sensor descrito em **E3** (i.e., o sensor está disposto na unidade de fileiras), para um técnico no assunto, seria óbvio modificar o local do sensor, visto que tal local é apenas uma mera questão de design.

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48. Por fim, entende-se, também, que seria óbvio para um técnico no assunto combinar os ensinamentos de **E1** ou **E2** com **E3**, de forma a alcançar uma invenção tal como do presente pedido de patente, isto é, um técnico o assunto, de posse dos ensinamentos de **E1** ou **E2**, seria motivado a modificar a máquina de **E3**, de forma a alcançar uma invenção tal como do presente pedido de patente em análise.

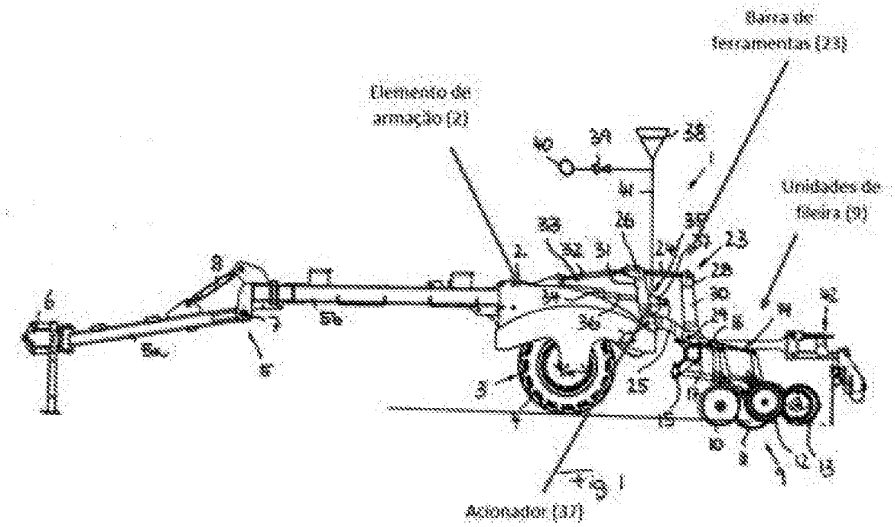
49. Isto posto, resta claro que a invenção descrita em **E3** apresenta as **características técnicas** descritas no presente pedido de patente e soluciona o mesmo problema técnico apresentado. Desta forma, **a invenção do presente pedido é antecipada pelos ensinamentos do documento E3, sozinho ou em combinação com E1 ou E2.**

Documento E4 - DE102006034798

50. O documento **E4** descreve uma máquina agrícola 1, particularmente uma semeadora, dotada de uma **estrutura de máquina 2**, que por sua vez compreende **um chassi 3 e um eixo de tração 5**. Uma extremidade do eixo de tração 5a é conectado a um trator e a extremidade oposta 5b permite que o chassi 3 se incline de maneira independente da altura do trator, isto é, a inclinação do chassi 3 é ajutada por meio de um atuador 8. **Uma linha de plantio 9 é fixada na estrutura de máquina 2**, e é articulada por meio de uma articulação de quatro barras 14 conectada a uma travessa 15 disposta na porção traseira do chassi 3, de **modo que a linha de plantio 9 pode ser movida para cima e para baixo em relação à travessa 15**. Ainda, para poder ajustar a profundidade de trabalho sem alterar a geometria da articulação de quatro barras 23, o ponto de articulação superior 26 no lado da estrutura da máquina 2 é projetado para ser ajustável. **Um dispositivo de ajuste de pressão no solo 35 é acoplado a linha de plantio 9 e compreende**

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um cilindro hidráulico 37 (vide parágrafos [0025] a [0028] e [0031] a [0033] de **D4**).



"[0025] The sowing machine 1 shown in the figures comprises a machine frame 2 which is supported on the ground via a chassis 3 which, in the embodiment shown, has a single-axle design and has wheels 4. The machine frame 2 can be attached via a drawbar 5 to a tractor, not shown, by means of a coupling piece 6 at the front end of the drawbar, which allows pivoting of the drawbar 5 about an upright pivot axis. In the illustrated embodiment, the drawbar 5 also includes a front drawbar section 5a, which is connected to a rear drawbar section 5b so that it can pivot about a horizontal transverse axis 7, so that the inclination of the machine frame 2 is independent of the height of the tractor-side coupling piece by buckling the drawbar about the transverse axis 7 can be adjusted by means of an actuator 8." (tradução livre).

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> *"[0026] A sowing unit 9 is fastened to the rear end of the machine frame 2 and is arranged following the chassis 3."* (tradução livre).
>
> *"[0028] The sowing unit 9 is articulated via a first four-bar linkage 14 to a crossbeam 15 trailing behind the chassis 3 , so that the sowing unit 9 can be moved up and down in relation to the crossbeam 15".* (tradução livre).
>
> *"[0031] In order to be able to adjust the working depth without changing the geometry of the four-bar linkage 23, the upper articulation point 26 on the machine frame side is designed to be adjustable."* (tradução livre).

51. Ainda, **E4** se propõe a solucinar os mesmos inconvenientes que o presente pedido visa solucionar por meio de uma linha de plantio que se adapta melhor aos contornos de um terreno (vide parágrado [0005] de **E4**).

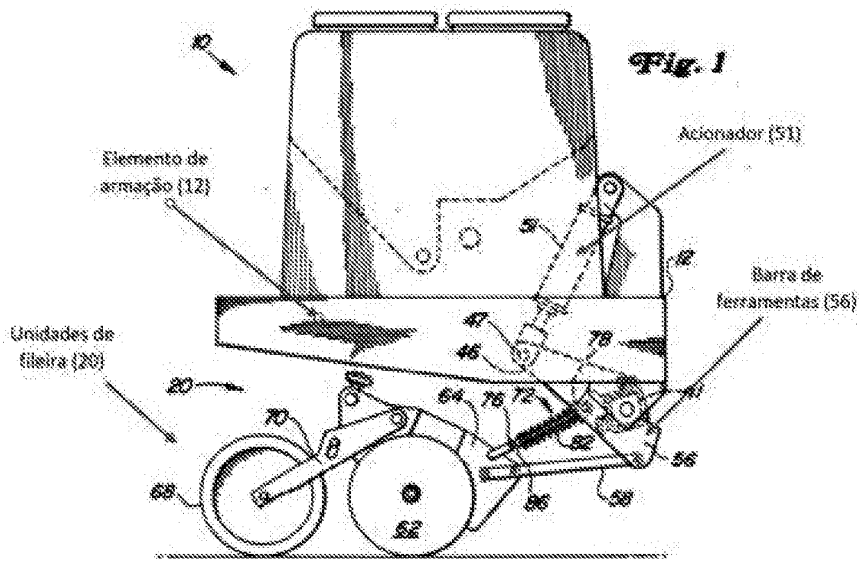
52. Assim, embora **E4** não descreva a presença de um sensor para realizar a inclinação da linha de plantio, um técnico no assunto de posse dos ensinamentos de **E1**, **E2** ou **E3**, seria motivado a modificar a máquina descrita por **E4**, acrescentando um sensor para que a linha de plantio melhor se adaptasse aos contornos inclinados do terreno, alcançando assim uma invenção similar a descrita pelo pedido de patente aqui contestado.

53. Isto posto, resta claro que a invenção descrita em **E4** apresenta as **características técnicas** descritas no presente pedido de patente e soluciona o mesmo problema técnico apresentado. Desta forma, **a invenção do presente pedido é antecipada pelos ensinamentos do documento E4 em combinação com E1, E2 ou E3.**

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Documento E5 - US5065681A

54. O documento **E5** descreve um **implemento agrícola** 10 dotado de uma **estrutura** 12 que compreende um **eixo transversal** 56, no qual um **conjunto de ferramentas de solo** 20 é conectado. Um **cilindro** 51 também é conectado ao eixo transversal 56 e a estrutura 12, fazendo com que, quando o cilindro é acionado (extendido ou retraído), o eixo 56 se mova de maneira a aumentar ou diminuir a pressão, respectivamente, do conjunto de ferramentas de solo 20 em relação ao solo (vide coluna 2, linha 65 a coluna 3, linha 62 de **E5**).



"A plurality of ground engaging tool assemblies 20 are mounted for rocking vertically with respect to the frame 12 between a lowered ground engaging position (FIG. 1) and a raised transport position."

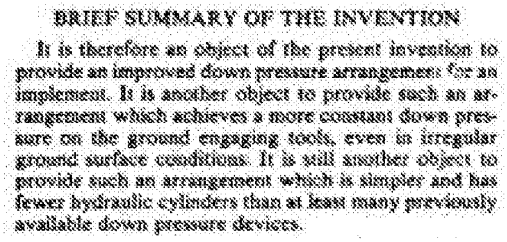
"Connected to each of the transverse rockshafts is a set of the ground engaging tool assemblies 20. A cylinder bracket 46 (FIG. 1)

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is also connected to each of the rockshafts and extends radially therefrom to a cylinder connecting end 47 which is pivotally connected to the rod end of one of three hydraulic cylinders 51, 52 and 53 associated with the respective sections 31, 32 and 33."

"Referring to FIG. I, as the cylinder 51 is extended the rockshaft 41 is rocked in the counter-clockwise direction to move the disk 62 and press wheel 68 into contact with the ground. Once in contact with the ground, further extension of the cylinder 51 causes the spring 82 to compress and urge the assembly 20 downwardly. Therefore the downward pressure on the opener assembly 20 is dependent upon the pressure of the cylinder 51."

55. **E5** propõe uma solução para o mesmo problema técnico que o pedido em análise busca sanar, conforme descrito no parágrafo [002] do relatório descritivo do presente pedido, a saber, manter as ferramentas de trabalho acopladas ao implemento agrícola a uma mesma profundidade do solo, mesmo quando o implemento se desloca sobre um terreno com planaltos ou voçorocas.



BRIEF SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide an improved down pressure arrangement for an implement. It is another object to provide such an arrangement which achieves a more constant down pressure on the ground engaging tools, even in irregular ground surface conditions. It is still another object to provide such an arrangement which is simpler and has fewer hydraulic cylinders than at least many previously available down pressure devices.

56. Por outro lado, **E5** não descreve a presença de um sensor para realizar a movimentação da linha de plantio, sendo que **E5** descreve que a movimentação é realizada por meio de uma válvula reguladora de pressão e uma válvula de controle do operador, no qual a pressão é definida através de um botão de controle de pressão.

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57. De toda forma, um técnico no assunto de posse dos ensinamentos de **E1**, **E2** ou **E3** e buscando automatizar a máquina descrita por **E5**, seria motivado a acrescentar um sensor na máquina para que a linha de plantio melhor se adaptasse aos contornos inclinados do terreno, alcançando assim uma invenção similar a descrita pelo pedido de patente aqui contestado.

58. Resta claro que a invenção descrita em **E5** apresenta as **características técnicas** descritas no presente pedido de patente e soluciona o mesmo problema técnico apresentado. Desta forma, **a invenção do presente pedido é antecipada pelos ensinamentos do documento E5 em combinação com E1, E2 ou E3.**

Documento E6 - US9031749

59. O documento **E6** descreve uma **semeadora pneumática** 10 compreendendo uma **viga** 68, uma **barra de ferramentas** transversal 78 fixada por meio por meio de conexões 74, 76 à viga 68, e **ferramentas de abertura de sulco** 22a fixadas à barra de ferramentas 78. Um par de **cilindros hidráulicos** 80, 82 é fixado entre a viga 68 e as conexões 74, 76 e têm por objetivo atuar para subir ou descer as ferramentas de abertura de sulco 22a. A semeadora ainda pode compreender um **sensor** 83 para detectar quando as ferramentas de abertura de sulco 22a estiverem em uma posição baixada (vide de coluna 4, linhas 29-51 de **E6**).

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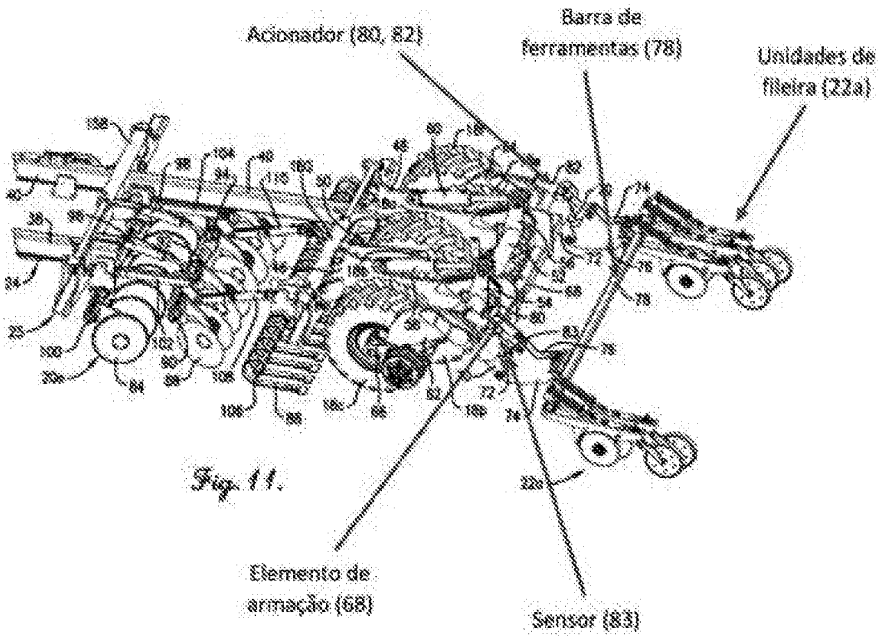


Fig. 11.

"Links 74,76 are fixed joined at their rearmost ends to a transverse toolbar 78 that supports a center gang 22a of the openers 22. A pair of hydraulic cylinders 80, 82 have their rod ends connected to links 74, 76 respectively and their base ends supported on upstanding structure fixed to transverse beam 68 for raising and lowering links 74, 76. Thus, when cylinders 80, 82 are actuated, they raise or lower the center gang of openers 22a relative to center frame section 24. For convenience, cylinders 80, 82 are hereinafter referred to as the "opener cylinders". As will be seen, opener cylinders 80, 82 are also utilized to apply down pressure to openers 22a. An opener down position sensor 83 (FIG. 11) in the nature of a proximity switch is mounted between one pair ofthe links 74,76 and is covered and uncovered thereby for detecting when openers 22a are in their lowered position."

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60. A semeadora de **E6** apresenta um **atuador** (um cilindro hidráulico), que atua para **pivotar a barra de ferramentas**. Por outro lado, o sensor definido por **E6** apenas detecta o posicionamento abaixado das linhas de plantio.

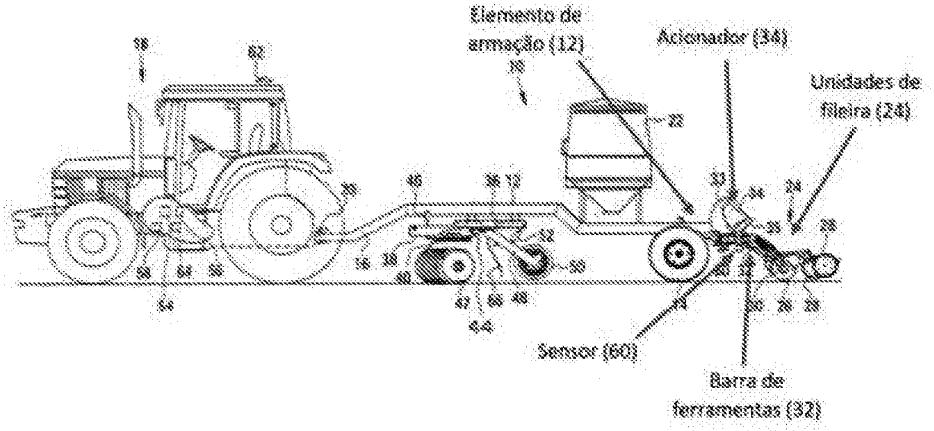
61. Entretanto, um técnico no assunto, procurando solucionar o inconveniente relacionado a manter as ferramentas de trabalho acopladas ao implemento agrícola a uma mesma profundidade do solo, e utilizando os ensinamentos de **E1**, **E2** ou **E3**, seria levado a alterar o sensor de **E6** de forma a também verificar quando as linhas de plantio não estão em uma posição predeterminada.

62. Resta claro, portanto, que a invenção descrita em **E6** apresenta as **características técnicas** descritas no presente pedido de patente e soluciona o mesmo problema técnico apresentado. Desta forma, **a invenção do presente pedido é antecipada pelos ensinamentos do documento E6 em combinação com E1, E2 ou E3.**

Documento E7 - US2003024450A1

63. O documento **E7** descreve uma **máquina agrícola** dotada de uma **estrutura** 12 a qual um **porta-ferramentas** 32 é acoplado. Uma pluralidade de **unidades de fileiras** 24 são suportadas pelo porta-ferramentas 32. As **unidades de fileira podem pivotar, e, consequentemente, ajustar a profundidade de semeadura**, por meio de um **atuador** 34. **E7** ainda prevê o uso de um **sensor** 60 para verificar a posição do atuador 34, de forma que a profundidade de semeadura pode ser regulada por um controlador 54 (vide parágrafos [0018] e [0023] de **E7**).

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"[0018] A plurality of seeding units 24 are supported on the transversely extending tool carrier 32. These seeding units 24 are arranged side-by-side on the tool carrier 32. The tool carrier 32 is supported on and extends rearwardly from frame 12. The seeding units 24 are pivotally mounted to the tool carrier 32 so they can pivot about an axis parallel to the longitudinal axis of the tool carrier 32. The pivot angle of the seeding units 24, and thereby the sowing depth, is fixed by seeding actuator 34 in the form of a hydraulic cylinder, extending between mount 33 on frame 12 and arm 35 coupled to seeding units 24."

"[0023] [...] Information about the position of actuator 34 is supplied to controller 54 via a sensor 60, so that the sowing depth of seeders 24 can be regulated by controller 54 by means of valve device 56."

64. Portanto, **E7** já antecipa um elemento de armação; uma barra de ferramentas acoplada ao elemento de armação por meio de uma junção articulada;

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uma unidade de fileiras acoplada à barra de ferramentas; e um acionador, tal como descrito no pedido aqui contestado.

65. No entanto, embora o sensor descrito por **E7** detecte o posicionamento do cilindro, o requerente entende que seria óbvio para um técnico no assunto modificar a configuração de tal sensor, de maneira a detectar uma posição da barra de ferramentas em relação ao chão, visto que, conforme pode ser visto na Figura 1 de **E7**, o sensor está acoplado à barra de ferramentas.

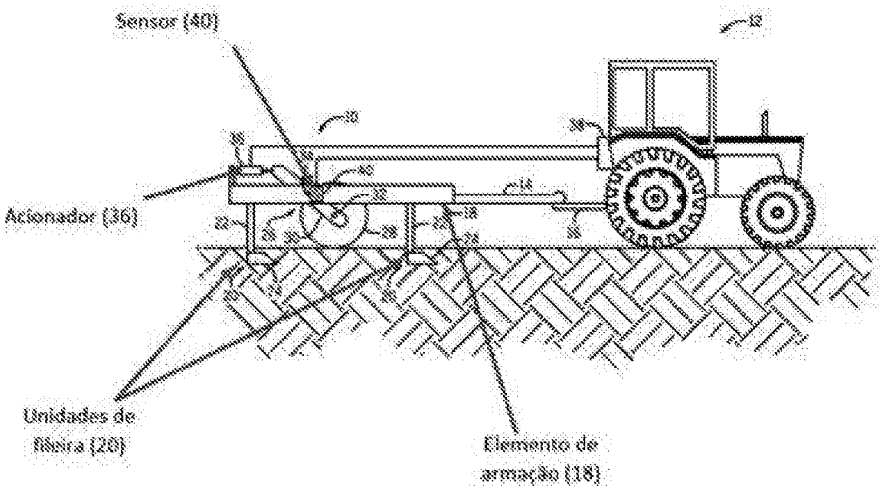
66. Ainda, um técnico no assunto de posse dos ensinamentos de **E1**, **E2** ou **E3** também seria motivado a modificar o sensor de **E7** de forma a alcançar uma invenção tal como a do presente pedido contestado.

67. Portanto, resta claro que a invenção descrita em **E7** apresenta as **características técnicas** descritas no presente pedido de patente e soluciona o mesmo problema técnico apresentado. Desta forma, **a invenção do presente pedido é antecipada pelos ensinamentos do documento E7, sozinho ou em combinação com E1, E2 ou E3.**

Documento E8 - US8857530B2

68. O documento **E8** descreve um **implemento agrícola 10** que é rebocado por veículo de trabalho, tal como um trator 12, e que compreende uma **estrutura de implemento 18** configurada para suportar múltiplas **ferramentas de penetração no solo 20**. O implemento 10 ainda compreende um **cilindro de controle de profundidade 36**, que está fluidamente acoplado a uma unidade de controle de fluido do trator 12 e um **sensor 40** disposto na estrutura 18, que é acoplado a unidade de controle de fluido do trator 12. O sensor 40 é configurado para emitir sinais indicativos da altura da estrutura em relação ao solo (vide coluna 2, linhas 43-64 e coluna 3, linhas 19-62 de **E8**).

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"FIG. 1 is a side view of an exemplary agricultural implement system, including an agricultural implement 10. The implement 10 is designed to be towed behind a work vehicle, such as the illustrated tractor 12. ***[…]*** *As illustrated, the tongue assembly 14 is coupled to an implement frame 18 configured to support multiple ground engaging tools 20. In the illustrated embodiment, each ground engaging tool 20 includes a shank 22 and a tillage point 24."*

"In the illustrated embodiment, the implement 10 includes a depth control cylinder 36 extending between the frame 18 and a second end of the arm 30. The depth control cylinder 36 is fluidly coupled to a fluid control unit 38 of the tow vehicle 12, and configured to rotate the arm 30 relative to the frame 18. ***[…]*** *For example, in the illustrated embodiment, the implement 10 includes a sensor 40*

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communicatively coupled to the fluid control unit 38, and configured to output signals indicative of the frame height. The fluid control unit 38 is configured to automatically control fluid flow to the depth control cylinder based on"

"As discussed in detail below, other embodiments may include a linear potentiometer configured to measure a position of the arm 30 relative to the frame 18, a linear potentiometer configured to measure extension of a depth control cylinder rod, or a transducer (e.g., ultrasonic, electromagnetic, infrared, etc.) configured to measure a height of the frame 18 above the soil surface."

69. Portanto, **E8** já antecipa um elemento de armação; uma unidade de fileiras; um acionador, e um sensor configurado para detectar a posição da estrutura em relação ao chão, tal como descrito no pedido de patente em debate.

70. Como se pode notar, o sensor descrito por **E8** está posicionado no elemento de armação, no entanto, o requerente entende que, para um técnico no assunto de posse dos ensinamentos de **E1**, **E2** ou **E3**, seria óbvio modificar a disposição de tal sensor, de maneira a colocá-lo na barra de ferramentas e assim, configurá-lo para detectar a posição da barra de ferramentas em relação ao chão, ao invés da altura do elemento de armação; alcançando assim uma invenção similar a do presente pedido contestado.

71. Portanto, resta claro que a invenção descrita em **E8** apresenta as **características técnicas** descritas no presente pedido de patente e, assim, soluciona o mesmo problema técnico apresentado. Desta forma, **a invenção do presente pedido é antecipada pelos ensinamentos do documento E8 em combinação com E1, E2 ou E3.**

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72. **Ainda como forma de subsidiar o exame da matéria, o Requerente vem destacar que o documento E8, deste subsídio, também foi apontado durante o exame do RECURSO CONTRA INDEFERIMENTO do pedido correspondente US2020/0084951, apresentado pela titular AGCO. Nesta fase recursal, o escritório de patente estadunidense – USPTO - MANTEVE O INDEFERIMENTO do pedido de patente correspondente US2020/0084951, por considerar que o objeto do pleito não é dotado de atividade inventiva frente as anterioridade apontadas.**

VI - CONCLUSÃO

73. O Requerente ressalta que as **principais características** reivindicadas no pedido BR112019010534-4 estão compreendidas no estado da técnica, quando confrontado com os documentos **D2** e **D4**, apontados pelo Sr. Examinador em seu parecer técnico, assim como os documentos **E1** a **E8**, sozinhos ou em combinação, aqui elencados pelo Requerente.

74. O Requerente aponta que, principalmente **o documento E3, apresenta as principais características técnicas do presente pedido**, **tanto do quadro reivindicatório original, apresentado no depósito do pedido, quanto do quadro reivindicatório conforme emendado na manifestação ao parecer apresentada pela titular. A combinação dos documentos E1 ou E2 com E3 também antecipa todas as características técnicas do presente pedido.**

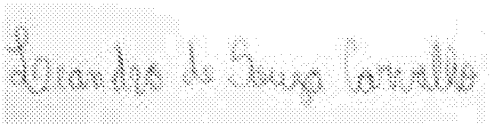
75. Ademais, ressaltamos que nenhuma das reivindicações dependentes trazem matéria nova capaz de conferir atividade inventiva ao objeto da invenção, frente aos documentos aqui apresentados.

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76. Diante de todo o todo acima exposto, tem-se claro que o presente pedido de patente de invenção **não atende aos critérios de PATENTEABILIDADE**. Conforme acima discutido, um técnico no assunto buscando solucionar o problema de implementos agrícolas possuindo seções longas e rígidas que não operam bem em campos irregulares, como depressões ou planaltos que comprometem a habilidade das unidades de fileiras de operar adequadamente no campo, obteria o invento proposto, de forma óbvia e sem qualquer necessidade de experimentação, a partir dos ensinamentos dos documentos **D2, D4** e **E1** a **E8.**

Isto posto, comprova-se, claramente a ausência dos requisitos legais, para a concessão do pedido de patente de invenção BR112019010534-4.

Nestes termos, espera o Requerente que seja **INDEFERIDO** o presente pedido patente de invenção, por ser medida de **DIREITO** e mais lídima **JUSTIÇA**.



LEANDRO DE SOUZA CARVALHO

CPF 089.419.437-28

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SERVIÇO PÚBLICO FEDERAL
MINISTÉRIO DA ECONOMIA
INSTITUTO NACIONAL DA PROPRIEDADE INDUSTRIAL

RELATÓRIO DE EXAME TÉCNICO

N.° do Pedido: BR112019010534-4 **N.° de Depósito PCT:** IB2017/001298
Data de Depósito: 26/10/2017
Prioridade Unionista: US 62/435,118 (16/12/2016)
Depositante: AGCO CORPORATION (US)
Inventor: BENJAMIN ANSON FANSHIER; REX SCHERTZ
Título: "Maquinário que contorna barra de ferramentas "

PARECER

O presente pedido de patente de invenção se refere, em uma modalidade, a um elemento de armação; uma barra de ferramentas acoplada ao elemento de armação, a barra de ferramenta estando paralela e na traseira do elemento de armação; uma unidade de fileiras acoplada à barra de ferramentas e um acionador acoplado entre o elemento de armação e a barra de ferramentas, o acionador sendo configurado para girar a barra de ferramentas com base na posição detectada da barra de ferramentas.

Este pedido entrou em fase nacional via petição 870190048263, de 23/05/2019.

Um parecer de exigência preliminar (despacho 6.23) foi exarado, cuja notificação ocorreu via RPI 2644 de 08/09/2021. E, em cumprimento às exigências, a requerente trouxe a petição 870210111916, de 02/12/2021, onde apresentou nova via do pedido contendo relatório descritivo sob novo título, quadro reivindicatório (20 reiv.) e resumo, que foi aceita e utilizada para exame.

Subsídios ao exame técnico foram apresentados por JIMER RAMOS DA COSTA, por intermédio da petição 870220004301, de 17/01/2022.

Subsídios ao exame técnico foram apresentados por JIMER RAMOS DA COSTA, por intermédio da petição 870220038309, de 03/05/2022.

Após o primeiro exame técnico, um parecer de "ciência" foi exarado, cuja notificação de sua publicidade ocorreu por meio da RPI 2701, de 11/10/2022. E em manifestação, a requerente apresentou a petição 870230001509, de 06/01/2023, onde trouxe novas vias do relatório descritivo sob novo título, quadro reivindicatório (18 reivindicações) e resumo.

Quadro referente à Agência Nacional de Vigilância Sanitária – ANVISA, ao Conselho de Gestão do Patrimônio Genético – CGEN e Sequências Biológicas	Sim	Não
O pedido foi encaminhado à ANVISA (art. 229-C da LPI, incluído pela Lei 10.196/2001)		X
A exigência ref. ao acesso ao patrimônio genético nacional foi emitida (Resol. INPI PR n.º 69/2013)		X
O pedido refere-se a Sequências Biológicas		X

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Comentários/Justificativas:

A requerente declarou voluntariamente junto à petição 870190048263, de 23/05/2019, pág. 4/57, que "*o objeto do presente pedido de patente de invenção não foi obtido em decorrência de acesso à amostra de componente do patrimônio genético brasileiro, o acesso foi realizado a partir de 30 de junho de 2000, ou não se aplica*".

Para fins de continuidade do exame estão sendo consideradas as seguintes vias:

Quadro 1 – Páginas do pedido examinadas			
Elemento	Páginas	n.º da Petição	Data
Relatório Descritivo	1 a 26	870230001509	06/01/2023
Listagem de sequências em formato impresso	-------	-------	-------
Listagem de sequências*	Código de Controle	-------	-------
Quadro Reivindicatório	1 a 4	870230001509	06/01/2023
Desenhos	1 a 7	870190048263	23/05/2019
Resumo	1	870230001509	06/01/2023

Comentários/Justificativas: -------

Quadro 2 – Considerações referentes aos Artigos 10, 18, 22 e 32 da Lei n.º 9.279 de 14 de maio de 1996 – LPI		
Artigos da LPI	**Sim**	**Não**
A matéria enquadra-se no art. 10 da LPI (não se considera invenção)		X
A matéria enquadra-se no art. 18 da LPI (não é patenteável)		X
O pedido apresenta Unidade de Invenção (art. 22 da LPI)	X	
O pedido está de acordo com disposto no art. 32 da LPI	X	

Comentários/Justificativas:

O acréscimo de matéria apontado em exame anterior foi adequadamente suprimido, deixando o presente pedido de acordo com as disposições do artigo 32 da LPI.

Quadro 3 – Considerações referentes aos Artigos 24 e 25 da LPI		
Artigos da LPI	**Sim**	**Não**
O relatório descritivo está de acordo com disposto no art. 24 da LPI	X	
O quadro reivindicatório está de acordo com disposto no art. 25 da LPI		X

Comentários/Justificativas:

Os números de referência foram inseridos no quadro reivindicatório.

A falta de suporte descritivo, apontada sobre a matéria da reivindicação 2, foi suprimida.

A proliferação desnecessária de reivindicações, apontada sobre a matéria da antiga reivindicação 19, foi suprimida.

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A caracterização inadequada da matéria, apontada sobre a antiga reivindicação 19, foi suprimida.

A falta de interligação da antiga reivindicação 20 foi suprimida.

Persiste o seguinte desacordo à norma, apontado em exame anterior:

- Os desenhos não atendem ao artigo 8º(II) da IN 30/2013, que determina que os desenhos devem conter todos os sinais de referência constantes no relatório descritivo. O sinal de referência (32) não está indicado nos desenhos.

Novo desacordo à Norma:

- O novo título não atende ao artigo 16(I) da IN 30/2013, e ao art. 29(I) da IN31/2013, porque não é "conciso, claro e preciso, identificando o objeto do pedido".

As normas do INPI, em relação ao título e aos desenhos, mencionadas anteriormente, não estão sendo seguidas, incorrendo em desacordo ao artigo 25 da LPI, por falta da condição de patenteabilidade "clareza", em relação ao objeto pleiteado.

Quadro 4 – Documentos citados no parecer		
Código	**Documento**	**Data de publicação**
D2	US2015230391	20/08/2015
D4	US8573319	05/11/2013

Comentários/Justificativas: ------

Quadro 5 – Análise dos Requisitos de Patenteabilidade (Arts. 8.º, 11, 13 e 15 da LPI)		
Requisito de Patenteabilidade	**Cumprimento**	**Reivindicações**
Aplicação Industrial	Sim	1 a 18
	Não	-------
Novidade	Sim	1 a 18
	Não	-------
Atividade Inventiva	Sim	-------
	Não	1 a 18

Comentários/Justificativas:

Em manifestação ao parecer exarado anteriormente, por meio da petição 870230001509, de 06/01/2023, a requerente contestou a falta de atividade inventiva apontada sobre a matéria do presente pedido. No entanto, os argumentos não foram suficientes para indicar a cumprimento ao requisito "atividade inventiva". As comparações apresentadas continuam indicando que a combinação de D2 (US2015230391) e D4 (US8573319) destituem a "atividade inventiva" da matéria em exame, haja vista a combinação das características técnicas destes documentos ser considerada óbvia para um técnico no assunto.

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As matérias definidas nas reivindicações 1 a 18 cumprem com o requisito "aplicação industrial" exigido pela combinação dos artigos 8º e 15 da LPI, tendo utilidade e possível exploração prática na indústria de máquinas agrícolas, com a devida repetibilidade.

O estado da técnica mais próximo da matéria reivindicada é formado pela combinação dos documentos D2 (US2015230391) e D4 (US8573319), que pertencem ao mesmo campo do pedido de patente, e que apresentam o maior número de características técnicas correspondentes com a matéria pleiteada. Além disso, o conteúdo de tais documentos pode, plenamente, ser combinado de maneira óbvia por um técnico no assunto.

As reivindicações 1 a 18 cumprem com o requisito "novidade" exigido pela combinação dos artigos 8º e 11 da LPI, perante o estado da técnica determinado para o presente pedido de patente de invenção, haja vista que nenhum documento do estado da técnica, isoladamente, revela a matéria pleiteada nestas reivindicações.

Em relação à **reivindicação 1**, a combinação dos documentos D2 (US2015230391) e D4 (US8573319) ensina um sistema de plantio (D2; Par. [0002]) que inclui uma pluralidade de conjuntos de linha de semeadura (36) (D2; Par. [0028]; Fig. 1), que suporta:

um elemento de armação (34) (D2; Par. [0027]; Fig. 1), podendo suportar roda, tal como as rodas (40) (D4; Col. 3, linha 28; Figs. 1-3);

uma barra de ferramentas (85) (D4; Par. [0031]; Fig. 3) que pode ser acoplada ao elemento de armação (34) (D2; Par. [0027]; Fig. 1), a barra de ferramentas (85) (D4; Par. [0031]; Fig. 3) podendo estar posicionada paralela e na traseira do elemento de armação (34) (D2; Par. [0027]; Fig. 1);

uma unidade de fileiras (36) (D2; Par. [0028]; Fig. 1) acoplada à barra de ferramentas (85) (D4; Par. [0031]; Fig. 3);

um acionador (100) (D4; Par. [0032]; Fig. 3) que pode ser acoplado entre um elemento de armação (34) (D2; Par. [0027]; Fig. 1) e uma barra de ferramentas (85) (D4; Par. [0031]; Fig. 3), o acionador (100) (D4; Par. [0032]; Fig. 3) configurado para girar a barra de ferramentas (85) (D4; Par. [0031]; Fig. 3) com base na posição detectada da barra de ferramentas (85) (D4; Par. [0031]; Fig. 3);

um primeiro sensor (112) (D2; Par. [0033]; Fig. 2A) podendo ser acoplado à barra de ferramentas (85) (D4; Par. [0031]; Fig. 3), o primeiro sensor (112) (D2; Par. [0033]; Fig. 2A) configurado para detectar a posição da barra de ferramentas (85) (D4; Par. [0031]; Fig. 3) em relação ao solo, em que a barra de ferramentas (85) (D4; Par. [0031]; Fig. 3) é girada com base em uma posição detectada da barra de ferramentas (85) (D4; Par. [0031]; Fig. 3).

As características técnicas da reivindicação 1 são sugeridas de maneira óbvia para um técnico no assunto a partir da combinação dos documentos D2 e D4, portanto a matéria desta reivindicação é desprovida do requisito "atividade inventiva", estando em desacordo ao artigo 8º combinado com artigo 13 da LPI.

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Em relação à **reivindicação 2**, a combinação dos documentos D2 (US2015230391) e D4 (US8573319) sugere de maneira óbvia para um técnico no assunto, um sistema de plantio (D2; Par. [0002]) que inclui uma pluralidade de conjuntos de linha de semeadura (36) (D2; Par. [0028]; Fig. 1), de acordo com a reivindicação 1, suportando um segundo sensor (114) (D2; Par. [0028]; Fig. 1) acoplado ao elemento de armação (34) (D2; Par. [0027]; Fig. 1), o segundo sensor (114) (D2; Par. [0028]; Fig. 1) configurado para detectar um ângulo da barra de ferramentas (85) (D4; Par. [0031]; Fig. 3) em relação ao elemento de armação (34) (D2; Par. [0027]; Fig. 1).

Em relação à **reivindicação 3**, a combinação dos documentos D2 (US2015230391) e D4 (US8573319) sugere de maneira óbvia para um técnico no assunto, um sistema de plantio (D2; Par. [0002]) que inclui uma pluralidade de conjuntos de linha de semeadura (36) (D2; Par. [0028]; Fig. 1), de acordo com a reivindicação 2, suportando um controlador (12) (D2; Par. [0034]; Figs. 3, 5), o controlador (12) sendo configurado para receber primeiro e segundo sinais dos primeiro (112) (D2; Par. [0033]; Fig. 2A) e segundo (114) (D2; Par. [0028]; Fig. 1) sensores e causar o acionamento do acionador (100) (D4; Par. [0032]; Fig. 3) com base nos primeiro e segundo sinais.

Em relação à **reivindicação 4**, a combinação dos documentos D2 (US2015230391) e D4 (US8573319) sugere de maneira óbvia para um técnico no assunto, um sistema de plantio (D2; Par. [0002]) que inclui uma pluralidade de conjuntos de linha de semeadura (36) (D2; Par. [0028]; Fig. 1), de acordo com a reivindicação 3, suportando um componente de controle (142) (D2; Par. [0036]; Figs. 3, 5) que ativa o acionador (100) (D4; Par. [0032]; Fig. 3), no qual o controlador (126) (D2; Par. [0034]; Figs. 3, 5) é configurado para causar o acionamento por meio do envio de um sinal para o componente de controle (142) (D2; Par. [0036]; Figs. 3, 5).

Em relação à **reivindicação 5**, a combinação dos documentos D2 (US2015230391) e D4 (US8573319) sugere de maneira óbvia para um técnico no assunto, um sistema de plantio (D2; Par. [0002]) que inclui uma pluralidade de conjuntos de linha de semeadura (36) (D2; Par. [0028]; Fig. 1), de acordo com a reivindicação 4, suportando um componente de controle (142) (D2; Par. [0036]; Figs. 3, 5) pode ser uma válvula de controle, uma válvula de ar, um componente de controle eletrônico, um componente de controle magnético, ou um componente de controle eletromagnético (D2; Par. [0036]).

Em relação à **reivindicação 6**, a combinação dos documentos D2 (US2015230391) e D4 (US8573319) sugere de maneira óbvia para um técnico no assunto, um sistema de plantio (D2; Par. [0002]) que inclui uma pluralidade de conjuntos de linha de semeadura (36) (D2; Par. [0028]; Fig. 1), de acordo com a reivindicação 3, suportando um controlador (126) (D2; Par. [0034]; Figs. 3, 5) ainda é configurado para fazer o ajuste de uma taxa de rotação com base nos primeiros sinais do primeiro sensor (D2; Par. [0033, 0034]).

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Em relação à **reivindicação 7**, a combinação dos documentos D2 (US2015230391) e D4 (US8573319) sugere de maneira óbvia para um técnico no assunto, um sistema de plantio (D2; Par. [0002]) que inclui uma pluralidade de conjuntos de linha de semeadura (36) (D2; Par. [0028]; Fig. 1), de acordo com a reivindicação 1, suportando um controlador (126) (D2; Par. [0034]; Figs. 3, 5), o controlador (126) (D2; Par. [0034]; Figs. 3, 5) sendo configurado para receber um sinal do primeiro sensor (112) (D2; Par. [0033]; Fig. 2A) e causar o acionamento do acionador (100) (D4; Par. [0032]; Fig. 3) com base no sinal (D2; Par. [0037]).

Em relação à **reivindicação 8**, a combinação dos documentos D2 (US2015230391) e D4 (US8573319) sugere de maneira óbvia para um técnico no assunto, um sistema de plantio (D2; Par. [0002]) que inclui uma pluralidade de conjuntos de linha de semeadura (36) (D2; Par. [0028]; Fig. 1), de acordo com a reivindicação 7, suportando um componente de controle (142) (D2; Par. [0036]; Figs. 3, 5) que ativa um acionador (100) (D4; Par. [0032]; Fig. 3), no qual o controlador (126) (D2; Par. [0034]; Figs. 3, 5) é configurado para causar o acionamento por meio do envio de um sinal para o componente de controle (D2; Par. [0037]).

Em relação à **reivindicação 9**, a combinação dos documentos D2 (US2015230391) e D4 (US8573319) sugere de maneira óbvia para um técnico no assunto, um sistema de plantio (D2; Par. [0002]) que inclui uma pluralidade de conjuntos de linha de semeadura (36) (D2; Par. [0028]; Fig. 1), de acordo com a reivindicação 8, suportando componente de controle (142) (D2; Par. [0036]; Figs. 3, 5) sendo uma válvula de controle, uma válvula de ar, um componente de controle eletrônico, um componente de controle magnético, ou um componente de controle eletromagnético (D2; Par. [0035, 0036]).

Em relação à **reivindicação 10**, a combinação dos documentos D2 (US2015230391) e D4 (US8573319) sugere de maneira óbvia para um técnico no assunto, um sistema de plantio (D2; Par. [0002]) que inclui uma pluralidade de conjuntos de linha de semeadura (36) (D2; Par. [0028]; Fig. 1), de acordo com a reivindicação 7, suportando controlador (126) (D2; Par. [0034]; Figs. 3, 5) configurado para fazer o ajuste de uma taxa de rotação com base no sinal do primeiro sensor (112) (D2; Par. [0033]; Fig. 2A) (D2; Par. [0037]).

Em relação à **reivindicação 11**, a combinação dos documentos D2 (US2015230391) e D4 (US8573319) sugere de maneira óbvia para um técnico no assunto, um sistema de plantio (D2; Par. [0002]) que inclui uma pluralidade de conjuntos de linha de semeadura (36) (D2; Par. [0028]; Fig. 1), de acordo com a reivindicação 1, cuja posição detectada refere-se a uma superfície do campo, que ainda suporta um ou mais sensores eletromagnéticos (sensores de força – D2; Par. [0041]) acoplados ao elemento de armação, a barra de ferramentas, ou uma combinação entre o elemento de armação e a barra de ferramentas, um ou mais sensores eletromagnéticos configurados para detectar uma elevação absoluta ou mudança na elevação

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entre a superfície do campo e a barra de ferramentas ou uma combinação tanto do elemento de armação quanto da barra de ferramentas (D2; Par. [0040-0044]).

Em relação à **reivindicação 12**, a combinação dos documentos D2 (US2015230391) e D4 (US8573319) sugere de maneira óbvia para um técnico no assunto, um sistema de plantio (D2; Par. [0002]) que inclui uma pluralidade de conjuntos de linha de semeadura (36) (D2; Par. [0028]; Fig. 1), de acordo com a reivindicação 11, suportando um controlador (126) (D2; Par. [0034]; Figs. 3, 5), o controlador (126) (D2; Par. [0034]; Figs. 3, 5) sendo configurado para receber um ou mais sinais de um ou mais sensores eletromagnéticos (sensores de força – D2; Par. [0041]) e causar o acionamento de um acionador (100) (D4; Par. [0032]; Fig. 3) com base em um ou mais sinais.

Em relação à **reivindicação 13**, a combinação dos documentos D2 (US2015230391) e D4 (US8573319) sugere de maneira óbvia para um técnico no assunto, um sistema de plantio (D2; Par. [0002]) que inclui uma pluralidade de conjuntos de linha de semeadura (36) (D2; Par. [0028]; Fig. 1), de acordo com a reivindicação 12, suportando um componente de controle (142) (D2; Par. [0036]; Figs. 3, 5) que ativa um acionador (100) (D4; Par. [0032]; Fig. 3), no qual o controlador (126) (D2; Par. [0034]; Figs. 3, 5) é configurado para causar o acionamento por meio do envio de um sinal para o componente de controle (142) (D2; Par. [0036]; Figs. 3, 5).

Em relação à **reivindicação 14**, a combinação dos documentos D2 (US2015230391) e D4 (US8573319) sugere de maneira óbvia para um técnico no assunto, um sistema de plantio (D2; Par. [0002]) que inclui uma pluralidade de conjuntos de linha de semeadura (36) (D2; Par. [0028]; Fig. 1), de acordo com a reivindicação 13, suportando componente de controle (142) (D2; Par. [0036]; Figs. 3, 5) sendo uma válvula de controle, uma válvula de ar, um componente de controle eletrônico, um componente de controle magnético, ou um componente de controle eletromagnético (D2; Par. [0035, 0036]).

Em relação à **reivindicação 15**, a combinação dos documentos D2 (US2015230391) e D4 (US8573319) sugere de maneira óbvia para um técnico no assunto, um sistema de plantio (D2; Par. [0002]) que inclui uma pluralidade de conjuntos de linha de semeadura (36) (D2; Par. [0028]; Fig. 1), de acordo com a reivindicação 12, suportando controlador (126) (D2; Par. [0034]; Figs. 3, 5) configurado para fazer o ajuste de uma taxa de rotação com base em um ou mais sinais de um ou mais sensores eletromagnéticos (112) (D2; Par. [0033]; Fig. 2A) (D2; Par. [0037, 0041-0044]).

Em relação à **reivindicação 16**, a combinação dos documentos D2 (US2015230391) e D4 (US8573319) sugere de maneira óbvia para um técnico no assunto, um sistema de plantio (D2; Par. [0002]) que inclui uma pluralidade de conjuntos de linha de semeadura (36) (D2; Par.

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[0028]; Fig. 1), de acordo com a reivindicação 11, suportando sensores eletromagnéticos sendo sensores ultrassônicos, LIDAR ou de radar (sensores de força – D2; Par. [0041]).

Em relação à **reivindicação 17**, a combinação dos documentos D2 (US2015230391) e D4 (US8573319) sugere de maneira óbvia para um técnico no assunto, um sistema de plantio (D2; Par. [0002]) que inclui uma pluralidade de conjuntos de linha de semeadura (36) (D2; Par. [0028]; Fig. 1), de acordo com a reivindicação 1, suportando acionador (100) (D4; Par. [0032]; Fig. 3) configurado para girar a barra de ferramentas (85) (D4; Par. [0031]; Fig. 3) em uma faixa de ângulos obtusos.

Em relação à **reivindicação 18**, a combinação dos documentos D2 (US2015230391) e D4 (US8573319) sugere de maneira óbvia para um técnico no assunto, um sistema de plantio (D2; Par. [0002]) que inclui uma pluralidade de conjuntos de linha de semeadura (36) (D2; Par. [0028]; Fig. 1), de acordo com a reivindicação 1, suportando pelo menos uma roda, tal como as rodas (40) (D4; Col. 3, linha 28; Figs. 1-3) acoplada ao elemento de armação (34) (D2; Par. [0027]; Fig. 1) e que pelo menos parcialmente suporta o elemento de armação (20, 54) em relação ao chão.

De acordo com as comparações anteriores, verifica-se que as características técnicas das reivindicações 1 a 18 encontram correspondência nos ensinamentos da combinação dos documentos D2 (US2015230391) e D4 (US8573319), o que torna estas reivindicações óbvias para um técnico no assunto a partir do estado da técnica. Portanto, a matéria pleiteada não cumpre com o requisito atividade inventiva, estando em desacordo ao artigo 8º combinado com artigo 13 da LPI.

Conclusão

Assim sendo, de acordo com o Art. 37, indefiro o presente pedido, uma vez que não cumpre com a condição de patenteabilidade "clareza", exigida pelo artigo 25 da LPI e, também, não atende ao requisito de "atividade inventiva" (art. 8º combinado com art. 13 da LPI), visto que as reivindicações são óbvias para um técnico no assunto com base nos documentos do estado da técnica, D2 (US2015230391) e D4 (US8573319).

De acordo com o Art. 212 da LPI, o depositante tem prazo de 60 (sessenta) dias, a partir da data de publicação na RPI, para interposição de recurso.

Publique-se o indeferimento (9.2).

Rio de Janeiro, 14 de janeiro de 2023.

Silver Rodrigues Zandoná
Pesquisador/ Mat. Nº 1758984
DIRPA / CGPAT II/DIPAE
Deleg. Comp. - Port. INPI/DIRPA Nº 016/17

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WRITTEN OPINION

The claimed invention relates, in one embodiment, to a frame member; a toolbar coupled to the frame member, the toolbar parallel to, and rearward of, the frame member; a row unit coupled to the toolbar; and an actuator coupled between the frame member and the toolbar, the actuator configured to rotate the toolbar based on a sensed position of the toolbar.

The patent application under analysis entered national (Brazilian) phase via petition No. 870190048263 on May 23 2019.

A preliminary requirement opinion (decision code 6.23) was issued on the application and published in Brazilian Industrial Property Journal 2644 on September 8 2021. In response to that, the applicant submitted (via petition No. 870210111916 on December 2nd 2021) a new application with a new title, a Set of Claims comprised of 20 claims and an Abstract, all accepted for analysis.

Supporting information as aid to the examination was presented by JIMER RAMOS DA COSTA via petitions No. 870220004301 on January 17 2022 and No. 870220039309 on May 3rd 2022.

A first-instance analysis was carried out (please refer to Brazilian Industrial Property Journal 2701 of October 11 2022). In response to that, the applicant submitted (via petition No. 870230001509 on January 6 2023) a new application with a new title, a Set of Claims comprised of 18 claims and an Abstract.

ANVISA, CGEN and Biological Sequences	Yes	No
The application was forwarded to ANVISA (Article 229-C of Law 9279/96 – the IP Law –, included by Law 10196/2001)		X
The requirement relative to the access to the Brazilian genetic heritage was imposed (Resolution No. PR 69/2013)		X
The application relates to Biological Sequences		X

Comments/Arguments: The applicant voluntarily declared through petition No. 870190048263 on May 23 3019 that the claimed subject matter was not obtained as a result of access to samples of components of the Brazilian genetic heritage, said access being performed as of June 30 2000 or does not apply.

Table 1 – Parts of the application analyzed			
Parts of the application	Pages	Petition No.	Dated
Specification	1-26	870230001509	January 6, 2023
Sequence Listing (hard copy)	-	-	-
Sequence Listing	Control Code	-	-
Set of Claims	1-4	870230001509	January 6, 2023
Figures	1-7	870190048263	May 23, 2019
Abstract	1	870230001509	January 6, 2023

Table 2 – Considerations regarding Articles 10, 18, 22 and 32 of the IP Law		
Articles of the IP Law	**Yes**	**No**
The claimed matter falls within the provisions of Article 10 of the IP Law (not considered to be invention)		**X**
The claimed matter falls within the provisions of Article 18 of the IP Law (not eligible for patent protection)		**X**
The application exhibits Unity of Invention (Article 22 of the IP Law)	**X**	
The application is in compliance with Article 32 of the IP Law	**X**	

Comments/Arguments: The addition of matter detected by the previous analysis was dealt with, and now the application is in compliance with Article 32 of the IP Law.

Table 3 – Considerations regarding Articles 24 and 25 of the IP Law		
Articles of the IP Law	**Yes**	**No**
The Specification is in compliance with Article 24 of the IP Law	**X**	

The Set of Claims is in compliance with Article 25 of the IP Law		**X**

Comments/Arguments:

The number references were inserted into the Set of Claims.

The lack of support for the matter of claim 2 was handled as well as the excessive number of claims.

The inadequate characterization of the matter (as in former claim 19) was handled, too.

The interconnection issue with former claim 20 was dealt with.

The figures, however, are still in violation with Article 8 (II) of Normative Instruction No. 30/2013 (number reference "32" was not found in the figures).

With the amendments to the application, the new title contravenes Article 16 (I) of Normative Instruction No. 30/2013 and Article 29 (I) of Normative Instruction No. 31/2013 as it is not concise, nor clear or precise.

All that contravenes Article 25 of the IP Law, as the claimed matter lacks clarity.

Table 4 – Relevant prior-art documents

Code	Document	Published on
D2	US2015230391	August 20, 2015
D4	US8573319	November 5, 2013

Table 5 – Analysis of the patentability requirements (Articles 8, 11, 13 and 15 of the IP Law)

Patentability Requirement	Compliance	Claims
Industrial Application	Yes	1-18
	No	-
Novelty	Yes	1-18
	No	-
Inventive Activity	Yes	-
	No	1-18

Comments/Arguments:

In response to the previous opinion (petition No. 870230001509 of January 6 2023), the applicant challenged the lack of inventive activity of the claimed matter as pointed out by the examiner. However, the applicant's arguments were not valid to support the inventiveness of the subject matter being claimed. The comparisons as provided still reveal that the combination of D2 with D4 destroys the inventive activity of the matter under analysis, as the combination of the technical features taught by said documents is obvious to a person skilled in the art.

The matters of claims 1-18 have industrial application (utility) as per Articles 8 and 15 of the IP Law, and can be exploited in the agricultural machinery industry.

The combination of D2 with D4, which belong in the same technical field as that of instant application, teaches the closest to the claimed matter. Moreover, the content of D2 and D4 can be obviously combined by a person skilled in the art.

Claims 1-18 are novel over D2 and D4, as per Articles 8 and 11 of the IP Law, as neither of said references, whether alone or combined, teaches the matter as disclosed in said claims.

As to **claim 1**, the combination of D2 and D4 discloses a planting system (D2; par. 0002) including a plurality of seeding row assemblies (36) (D2; par. 0028; fig. 1) comprising:

• a frame member (34) (D2; par. 0027; fig. 1) that can support wheels, such as the wheel assemblies (40) (D4; col. 3, l. 28; fig. 1-3);

• a toolbar (85) (D4; par. 0031; fig. 3) which can be coupled to the frame member (34) (D2; par. 0027; fig. 1), the toolbar (85) (D4; par. 0031; fig. 3) can be parallel to, and rearward of, the frame member (34) (D2; par. 0027; fig. 1);

• a row unit (36) (D2; par. 0028; fig. 1) coupled to the toolbar (85) (D4; par. 0031; fig. 3);

• an actuator (100) (D4; par. 0032; fig. 3) which can be coupled between the frame member (34) (D2; par. 0027; fig. 1) and the toolbar (85) (D4; par. 0031; fig. 3), the actuator (100) (D4; par. 0032; fig. 3) configured to rotate the toolbar (85) (D4; par. 0031; fig. 3) based on a sensed position of the toolbar (85) (D4; par. 0031; fig. 3);

• a first sensor (112) (D2; par. 0033; fig. 2A) which can be coupled to the toolbar (85) (D4; par. 0031; fig. 3), the first sensor (112) (D2; par. 0033; fig. 2A) configured to sense a position of the toolbar (85) (D4; par. 0031; fig. 3) relative to ground, wherein the

toolbar (85) (D4; par. 0031; fig. 3) is rotated based on a sensed position of the toolbar (85) (D4; par. 0031; fig. 3).

The technical features of claim 1 are an obvious combination of the teachings of D2 with D4, which means said claim lacks inventive activity over said documents, thus in non-compliance with Articles 8 and 13 of the IP Law.

As to **claim 2**, the combination of D2 and D4 obviously suggests to a skilled artisan a planting system (D2; par. 0002) including a plurality of seeding row assemblies (36) (D2; par. 0028; fig. 1), according to claim 1, comprising a second sensor (114) (D2; par. 0028; fig. 1) coupled to the frame member (34) (D2; par. 0027; fig. 1), the second sensor (114) (D2; par. 0028; fig. 1) configured to sense an angle of the toolbar (85) (D4; par. 0031; fig. 3) relative to the frame member (34) (D2; par. 0027; fig. 1).

As to **claim 3**, the combination of D2 and D4 obviously suggests to a skilled artisan a planting system (D2; par. 0002) including a plurality of seeding row assemblies (36) (D2; par. 0028; fig. 1), according to claim 2, comprising a controller (12) (D2; par. 0034; fig. 3 and 5), the controller (12) (D2; par. 0034; fig. 3 and 5) configured to receive first and second signals from the first (112) (D2; par. 0033; fig. 2A) and second (114) (D2; par. 0028; fig. 1) sensors and cause actuation of the actuator (100) (D4; par. 0032; fig. 3) based on first and second signals.

As to **claim 4**, the combination of D2 and D4 obviously suggests to a skilled artisan a planting system (D2; par. 0002) including a plurality of seeding row assemblies (36) (D2; par. 0028; fig. 1), according to claim 3, comprising a control component (142) (D2; par. 0036; fig. 3 and 5) that actuates the actuator (100) (D4; par. 0032; fig. 3), wherein the controller (126) (D2; par. 0034; fig. 3 and 5) is configured to cause actuation by sending a signal to the control component (142) (D2; par. 0036; fig. 3 and 5).

As to **claim 5**, the combination of D2 and D4 obviously suggests to a skilled artisan a planting system (D2; par. 0002) including a plurality of seeding row assemblies (36) (D2; par. 0028; fig. 1), according to claim 4, comprising a control component (142) (D2; par. 0036; fig. 3 and 5) that can be a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component (D2; par. 0036).

As to **claim 6**, the combination of D2 and D4 obviously suggests to a skilled artisan a planting system (D2; par. 0002) including a plurality of seeding row assemblies (36) (D2; par. 0028; fig. 1), according to claim 3, comprising a controller (126) (D2; par. 0034;

fig. 3 and 5) which is further configured to cause adjustment of a rate of rotation based on the first signals from the first sensor (D2; par. 0033 and 0034).

As to **claim 7**, the combination of D2 and D4 obviously suggests to a skilled artisan a planting system (D2; par. 0002) including a plurality of seeding row assemblies (36) (D2; par. 0028; fig. 1), according to claim 1, comprising a controller (126) (D2; par. 0034; fig. 3 and 5) which is configured to receive a signal from the first sensor (112) (D2; par. 0033; fig. 2A) and cause actuation of the actuator (100) (D4; par. 0032; fig. 3) based on the signal. (D2; par. 0037).

As to **claim 8**, the combination of D2 and D4 obviously suggests to a skilled artisan a planting system (D2; par. 0002) including a plurality of seeding row assemblies (36) (D2; par. 0028; fig. 1), according to claim 7, comprising a control component (142) (D2; par. 0036; fig. 3 and 5) that actuates the actuator (100) (D4; par. 0032; fig. 3), wherein the controller (126) (D2; par. 0034; fig. 3 and 5) is configured to cause actuation by sending a signal to the control component (D2; par. 0037).

As to **claim 9**, the combination of D2 and D4 obviously suggests to a skilled artisan a planting system (D2; par. 0002) including a plurality of seeding row assemblies (36) (D2; par. 0028; fig. 1), according to claim 8, comprising a control component (142) (D2; par. 0036; fig. 3 and 5) which is a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component (D2; par. 0035 and 0036).

As to **claim 10**, the combination of D2 and D4 obviously suggests to a skilled artisan a planting system (D2; par. 0002) including a plurality of seeding row assemblies (36) (D2; par. 0028; fig. 1), according to claim 7, comprising a controller (126) (D2; par. 0034; fig. 3 and 5) configured to cause adjustment of a rate of rotation based on the signal from the first sensor (112) (D2; par. 0033; fig. 2A) (D2; par. 0037).

As to **claim 11**, the combination of D2 and D4 obviously suggests to a skilled artisan a planting system (D2; par. 0002) including a plurality of seeding row assemblies (36) (D2; par. 0028; fig. 1), according to claim 1, wherein the sensed position is relative to a field surface, further comprising one or more electromagnetic sensors (force sensors – D2; par. 0041) coupled to the frame member, the toolbar, or a combination of the frame member and the toolbar, the one or more electromagnetic sensors configured to sense an absolute elevation or change in elevation between the field surface and the toolbar or a combination of both the frame member and the toolbar (D2; par. 0040-0044).

As to **claim 12**, the combination of D2 and D4 obviously suggests to a skilled artisan a planting system (D2; par. 0002) including a plurality of seeding row assemblies (36) (D2; par. 0028; fig. 1), according to claim 11, comprising a controller (126) (D2; par. 0034; fig. 3 and 5), the controller (126) (D2; par. 0034; fig. 3 and 5) configured to receive one or more signals from the one or more electromagnetic sensors (force sensors – D2; par. 0041) and cause actuation of the actuator (100) (D4; par. 0032; fig. 3) based on the one or more signals.

As to **claim 13**, the combination of D2 and D4 obviously suggests to a skilled artisan a planting system (D2; par. 0002) including a plurality of seeding row assemblies (36) (D2; par. 0028; fig. 1), according to claim 12, comprising a control component (142) (D2; par. 0036; fig. 3 and 5) that actuates an actuator (100) (D4; par. 0032; fig. 3), wherein the controller (126) (D2; par. 0034; fig. 3 and 5) is configured to cause actuation by sending a signal to the control component (142) (D2; par. 0036; fig. 3 and 5).

As to **claim 14**, the combination of D2 and D4 obviously suggests to a skilled artisan a planting system (D2; par. 0002) including a plurality of seeding row assemblies (36) (D2; par. 0028; fig. 1), according to claim 13, comprising a control component (142) (D2; par. 0036; fig. 3 and 5) which is a control valve, an air valve, an electronic control component, a magnetic control component, or an electromagnetic control component (D2; par. 0035 and 0036).

As to **claim 15**, the combination of D2 and D4 obviously suggests to a skilled artisan a planting system (D2; par. 0002) including a plurality of seeding row assemblies (36) (D2; par. 0028; fig. 1), according to claim 12, comprising a controller (126) (D2; par. 0034; fig. 3 and 5) configured to cause adjustment of a rate of rotation based on one or more signals from one or more electromagnetic sensors (112) (D2; par. 0033; fig. 2A) (D2; par. 0037, 0041-0044).

As to **claim 16**, the combination of D2 and D4 obviously suggests to a skilled artisan a planting system (D2; par. 0002) including a plurality of seeding row assemblies (36) (D2; par. 0028; fig. 1), according to claim 11, comprising electromagnetic sensors which are ultrasonic, lidar, or radar sensors (force sensors – D2; par. 0041).

As to **claim 17**, the combination of D2 and D4 obviously suggests to a skilled artisan a planting system (D2; par. 0002) including a plurality of seeding row assemblies (36) (D2; par. 0028; fig. 1), according to claim 1, comprising an actuator (100) (D4; par.

0032; fig. 3) configured to rotate the toolbar (85) (D4; par. 0031; fig. 3) throughout an obtuse angle range.

As to **claim 18**, the combination of D2 and D4 obviously suggests to a skilled artisan a planting system (D2; par. 0002) including a plurality of seeding row assemblies (36) (D2; par. 0028; fig. 1), according to claim 1, comprising at least one wheel, such as the wheel assemblies (40) (D4; col. 3, l. 28; fig. 1-3) coupled to the frame member (34) (D2; par. 0027; fig. 1) and that at least partially supports the frame member (20, 54) relative to ground.

In view of the above, we learned that the technical features of claims 1 to 18 can be found in the combination of D2 with D4, which renders said claims obvious to a person skilled in the art acquainted with the teachings of said prior-art documents. Hence, the presently claimed subject matter is devoid of inventive activity, which contravenes Articles 8 and 13 of the IP Law.

Conclusion

According to Article 37 of the IP Law, the application is hereby rejected as its subject matter lacks clarity (non-compliance with Article 25 of the IP Law) and is devoid of inventive activity (non-compliance with Articles 8 and 13 of the IP Law) as the claims are obvious to the skilled artisan aware of the teachings of D2 and D4.

The applicant is entitled to file an appeal against this decision in no later than sixty (60) days from the publication thereof in the Brazilian Industrial Property Journal as set forth in Article 212 of the IP Law.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/470,472	06/17/2019	Benjamin Anson Fanshier	US1640/WO-US	1653

88988 7590 03/02/2023

AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston, KS 67062

EXAMINER	
LUTZ, JESSICA H	

ART UNIT	PAPER NUMBER
3671	

NOTIFICATION DATE	DELIVERY MODE
03/02/2023	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patents@agcocorp.com

Applicant-Initiated Interview Summary	**Application No.** 16/470,472	**Applicant(s)** Fanshier et al.		
	Examiner JESSICA H LUTZ	**Art Unit** 3671	**AIA (First Inventor to File) Status** Yes	**Page** 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	**Title**	**Type**
JESSICA H LUTZ	Primary Examiner	Telephonic
Nathan Whitlock	Attorney of Record	

Date of Interview: 17 February 2023

Issues Discussed:

35 U.S.C. 102

Applicant proposed incorporating claim 3 into independent claims 1 and 9 and discussed prior art Hubalek (US 9,031,749) and Houck (US 2015/0230391). Applicant will file amendments and remarks. Further search and consideration is needed.

/JESSICA H LUTZ/ Primary Examiner, Art Unit 3671	

Applicant is reminded that a complete written statement as to the substance of the interview must be made of record in the application file. It is the applicants responsibility to provide the written statement, unless the interview was initiated by the Examiner and the Examiner has indicated that a written summary will be provided. See MPEP 713.04
Please further see:
MPEP 713.04
Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews, paragraph (b)
37 CFR § 1.2 Business to be transacted in writing

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
AGCO - Exhibit No. 2005
IPR2024-001459
Page 787

To: patents@agcocorp.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 88988

Mar 02, 2023 03:42:47 AM

Dear PAIR Customer:

AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston, KS 67062
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 88988 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:
The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
16470472	EXIN	03/02/2023	US1640/WO-US

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
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www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

88988 7590 03/29/2023

AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston, KS 67062

EXAMINER	
LUTZ, JESSICA H	
ART UNIT	PAPER NUMBER
3671	

DATE MAILED: 03/29/2023

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/470,472	06/17/2019	Benjamin Anson Fanshier	US1640/WO-US	1653

TITLE OF INVENTION: IMPLEMENT CONTOURING TOOLBAR

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	06/29/2023

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 40% the amount of undiscounted fees, and micro entity fees are 20% the amount of undiscounted fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PTOL-85 (Rev. 02/11)

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

88988 7590 03/29/2023

AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston, KS 67062

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/470,472	06/17/2019	Benjamin Anson Fanshier	US1640/WO-US	1653

TITLE OF INVENTION: IMPLEMENT CONTOURING TOOLBAR

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	06/29/2023

EXAMINER	ART UNIT	CLASS-SUBCLASS
LUTZ, JESSICA H	3671	172-004000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑Issue Fee ❑Publication Fee (if required)

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via Patent Center or EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

❑ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

❑ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
AGCO - Exhibit No. 2005
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UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/470,472	06/17/2019	Benjamin Anson Fanshier	US1640/WO-US	1653

88988 7590 03/29/2023

AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston, KS 67062

EXAMINER	
LUTZ, JESSICA H	

ART UNIT	PAPER NUMBER
3671	

DATE MAILED: 03/29/2023

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

PTOL-85 (Rev. 02/11)

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
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OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 16/470,472	Applicant(s) Fanshier et al.	
	Examiner JESSICA H LUTZ	Art Unit 3671	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to 2/17/23.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1,4-19 and 21 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information , please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/JESSICA H LUTZ/
Primary Examiner, Art Unit 3671

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
AGCO - Exhibit No. 2005
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Page 793

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/470,472	Fanshier et al.
	Examiner	**Art Unit**
	JESSICA H LUTZ	3671

CPC						
Symbol					**Type**	**Version**
A01B	/	63	/	114	F	2013-01-01
A01B	/	63	/	102	I	2013-01-01
A01B	/	63	/	1112	I	2013-01-01
A01B	/	63	/	28	I	2013-01-01

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE (Assistant Examiner) (Date)		**Total Claims Allowed:** 18	
/JESSICA H LUTZ/ Primary Examiner, Art Unit 3671 (Primary Examiner)	24 March 2023 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 3

U.S. Patent and Trademark Office — Part of Paper No.: 20230324

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
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Page 794

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/470,472	Fanshier et al.
	Examiner	**Art Unit**
	JESSICA H LUTZ	3671

INTERNATIONAL CLASSIFICATION					
CLAIMED					
A01B63/114	/	63	/	114	
A01B63/102	/	63	/	102	
A01B63/111	/	63	/	111	
A01B63/28	/	63	/	28	

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

NONE (Assistant Examiner) (Date)	**Total Claims Allowed:** 18	
/JESSICA H LUTZ/ Primary Examiner, Art Unit 3671 (Primary Examiner) 24 March 2023 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 3

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
AGCO - Exhibit No. 2005
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Page 795

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/470,472	Fanshier et al.
	Examiner	**Art Unit**
	JESSICA H LUTZ	3671

☑ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	18	
/JESSICA H LUTZ/ Primary Examiner, Art Unit 3671	24 March 2023	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	3

U.S. Patent and Trademark Office — Part of Paper No.: 20230324

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/470,472	Fanshier et al.
	Examiner	Art Unit
	JESSICA H LUTZ	3671

CPC - Searched*		
Symbol	Date	Examiner
a01b 63/114,102,1112,28, 045, 008, 10	06/19/2021	jl
a01b 49/00,027	07/12/2022	jl

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
EAST text (see attached)	06/19/2021	jl
inventor name search	06/19/2021	jl
Updated search	07/13/2022	jl
Updated search	01/26/2023	jl
Updated search	03/24/2023	jl
Interference search	03/24/2023	jl

/JESSICA H LUTZ/ Primary Examiner, Art Unit 3671	

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/470,472	Fanshier et al.
	Examiner	Art Unit
	JESSICA H LUTZ	3671

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
a01b	63/04; 49/00,02	03/24/2023	jl

/JESSICA H LUTZ/ Primary Examiner, Art Unit 3671	

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PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	26	((("FANSHIER") near3 ("Benjamin")) OR (("SCHERTZ") near3 ("Rex"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	OFF	OFF	2021/06/18 10:07 AM
L2	15	("20020017090"|"20020017389"|"20080308020"|"20110120357"|"20110284252"|"20110315410"|"20120298388"|"20140069670"|"20140196996"|"20150156955"|"20150230391"|"4825958"|"5511623"|"6076611"|"6112827").PN.	(US-PGPUB; USPAT)	OR	OFF	OFF	2021/06/18 10:09 AM
L3	0	"2015289438"	(US-PGPUB; USPAT)	OR	OFF	OFF	2021/06/18 07:50 PM
L4	7	sauder.inv. and depth near sensing	(US-PGPUB; USPAT)	OR	OFF	OFF	2021/06/18 07:52 PM
L5	1078	(ground soil) with sens$3 with angle and (down near pressure actuator) and (frame tool toolbar)	(US-PGPUB; USPAT)	OR	OFF	OFF	2021/06/18 07:56 PM
L6	1418	(ground soil) with sens$3 with angle and (down near pressure actuator) and (frame tool toolbar)	(US-PGPUB; USPAT)	OR	ON	ON	2021/06/18 07:56 PM
L7	10	((ground soil) and sens$3 and angle and (cylinder actuator)and toolbar).clm.	(US-PGPUB; USPAT)	OR	OFF	OFF	2021/06/18 07:58 PM
L8	10	((ground soil) and sens$3 and angle and (cylinder actuator)and tool adj bar).clm.	(US-PGPUB; USPAT)	OR	OFF	OFF	2021/06/18 07:58 PM
L9	1	(14/623758).APP.	(USPAT; USOCR)	OR	OFF	OFF	2021/06/18 08:04 PM
L10	43	("20090301743" | "20120060731" | "20130032363" | "20130192186" | "20140048296" | "20140060862" | "20150230391" | "3673970" | "3749035" | "4044697" | "4176721" | "4353423" | "4377979" | "4422511" | "4444271" |	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2021/06/18 08:04 PM

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		"4506609" | "5479992" | "5499683" | "5590721" | "5640914" | "5653292" | "6085846" | "6971452" | "8201637" | "8235130" | "8448717" | "8534373" | "8573319" | "8577561" | "8601961" | "8657023" | "8857530" | "9232687").PN. OR ("9554504").URPN.					
L11	475	a01b63/114,102,1112,28.cpc.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2021/06/18 08:31 PM
L12	1	(12/783655).APP.	(USPAT; USOCR)	OR	OFF	OFF	2021/06/18 08:33 PM
L13	46	("20070163791" | "20080093093" | "20100025056" | "2595461" | "2605686" | "2715286" | "2918979" | "2958383" | "3752092" | "4158391" | "4519460" | "4763915" | "4821806" | "4867247" | "5042589" | "5234060" | "5669452" | "5868207" | "6305478" | "6378619" | "6698523" | "7478682" | "7581597").PN. OR ("8567517").URPN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2021/06/18 08:33 PM
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L15	21	toolbar and agricultur$2 and depth near sensing	(US-PGPUB; USPAT)	OR	OFF	OFF	2021/06/19 11:36 AM
L16	18	(US-20150230391-$ or US-20150289438-$ or US-20190373801-$ or US-20190021211-$ or US-20130112124-$ or US-20130112123-	(US-PGPUB; USPAT)	OR	OFF	OFF	2021/06/19 05:22 PM

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		$).did. or (US-6076611-$ or US-10561052-$ or US-10939604-$ or US-8857530-$ or US-8573319-$ or US-5653292-$ or US-5499683-$ or US-5479992-$ or US-10506756-$ or US-9930823-$ or US-9253937-$ or US-6378619-$).did.					
L17	15	("20020017090"|"20020017389"|"20080308020"|"20110120357"|"20110284252"|"20110315410"|"20120298388"|"20140069670"|"20140196996"|"20150156955"|"20150230391"|"4825958"|"5511623"|"6076611"|"6112827").PN.	(US-PGPUB; USPAT)	OR	OFF	OFF	2021/06/19 05:22 PM
L18	11	L16 not L17	(USPAT)	OR	OFF	OFF	2021/06/19 05:22 PM
L19	16	L16 not L17	(US-PGPUB; USPAT)	OR	OFF	OFF	2021/06/19 05:22 PM
L20	73	"8573319"	(US-PGPUB; USPAT)	OR	ON	ON	2021/10/23 04:12 PM
L21	2842	a01b63/114,102,1112,28.cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2022/07/15 07:04 AM
L22	118	"9301439"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2022/07/15 09:11 AM
L23	25	"9301439"	(USPAT)	OR	OFF	OFF	2022/07/15 09:11 AM
L24	713	a01b49/00.cpc.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2022/07/16 09:19 AM

L25	40	a01b63/045.cpc.	(US-PGPUB; USPAT)	OR	OFF	OFF	2022/07/16 09:20 AM
L26	4718	a01b63/008,10.cpc.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2022/07/16 09:21 AM
L27	1057	a01b49/00,027.cpc.	(US-PGPUB; USPAT)	OR	OFF	OFF	2022/07/16 09:22 AM
L28	48	((US-20200236873-A1 OR US-20180070523-A1 OR US-20170339819-A1 OR US-20210298215-A1 OR US-20130062083-A1 OR US-20200146201-A1 OR US-20200093052-A1 OR US-20220132720-A1).did. AND PGPB.dbnm.) OR ((US-10959367-B2 OR US-10820471-B2 OR US-9615500-B2 OR US-10925203-B2 OR US-10813265-B2 OR US-6263977-B1 OR US-10412875-B2 OR US-10412873-B2 OR US-11197408-B2 OR US-10368474-B2 OR US-10827665-B2 OR US-10537052-B2 OR US-10820470-B2 OR US-5590721-A OR US-9635797-B2 OR US-10368471-B2 OR US-9686899-B2 OR US-10602653-B2 OR US-9301439-B2 OR US-10405476-B2 OR US-9253937-B2 OR US-7921931-B2 OR US-10750653-B2).did. AND USPT.dbnm.) OR ((US-20180070523-A1 OR US-5653292-A OR US-20150012189-A1 OR US-20150053439-A1 OR US-20180116095-A1 OR EP-3501248-A1 OR US-20190150350-A1 OR US-20190021211-A1 OR	(US-PGPUB; USPAT; DERWENT; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS)	OR	OFF	OFF	2022/07/16 03:42 PM

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		US-20180295769-A1 OR US-20160134844-A1 OR DE-102017121152-A1 OR US-20140041563-A1 OR WO-2019010239-A1).did. AND DWPI.dbnm.) OR ((KR-102302749-B1 OR KR-20140104720-A).did. AND FTDB.dbnm.) OR ((KR-101423669-B1 OR DE-102009044898-A1).did. AND FPRS.dbnm.)					
L30	25	L28 AND sens$3	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2022/07/16 03:42 PM
L31	152	((US-20200084951-A1 OR US-20150230391-A1 OR US-20150156955-A1 OR US-20140196996-A1 OR US-20140069670-A1 OR US-20120298388-A1 OR US-20110315410-A1 OR US-20110284252-A1 OR US-20110120357-A1 OR US-20080308020-A1 OR US-20020017389-A1 OR US-20020017090-A1 OR US-20150289438-A1 OR US-20210051837-A1 OR US-20200344937-A1 OR US-20200100421-A1 OR US-20180014450-A1 OR US-20170006761-A1 OR US-20170006758-A1 OR US-20210037695-A1 OR US-20190373801-A1 OR US-20190021211-A1 OR US-20130112124-A1 OR US-20130112123-A1 OR US-20210095438-A1 OR US-20190075710-	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 06:13 PM

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		A1 OR US-20200404837-A1 OR US-20200404830-A1 OR US-20200383260-A1 OR US-20200359562-A1 OR US-20200359559-A1 OR US-20140060862-A1 OR US-20140048296-A1 OR US-20130192186-A1 OR US-20130032363-A1 OR US-20120060731-A1 OR US-20090301743-A1 OR US-20100025056-A1 OR US-20080093093-A1 OR US-20200068783-A1 OR US-20190110392-A1 OR US-20190110391-A1 OR US-20190110388-A1 OR US-20200093052-A1 OR US-20200344939-A1 OR US-20210298215-A1 OR US-20200236873-A1 OR US-20130062083-A1 OR US-20200146201-A1 OR US-20220132720-A1 OR US-20210298217-A1 OR US-20170339819-A1 OR US-20180070523-A1).did. AND PGPB.dbnm.) OR ((US-6112827-A OR US-6076611-A OR US-5511623-A OR US-4825958-A OR US-10123475-B2 OR US-9554504-B2 OR US-10561052-B2 OR US-10939604-B2 OR US-10838432-B2 OR US-10701854-B2 OR US-9232687-B2 OR US-8857530-B2 OR US-8657023-B2 OR US-8577561-B2 OR US-8573319-B1 OR US-5653292-A OR US-5640914-A OR US-5590721-A OR US-5499683-A OR US-5479992-A OR US-					

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		4444271-A OR US-4353423-A OR US-5794421-A OR US-5065681-A OR US-4300638-A OR US-2622499-A OR US-8567517-B2 OR US-10537052-B2 OR US-10506756-B2 OR US-8657026-B2 OR US-10368471-B2 OR US-10342171-B2 OR US-10299423-B2 OR US-10021822-B2 OR US-9930823-B2 OR US-9253937-B2 OR US-9198341-B2 OR US-6378619-B2 OR US-4763915-A OR US-10813264-B2 OR US-10925203-B2 OR US-11382258-B1 OR US-1347992-A OR US-9301439-B2 OR US-2081346-A OR US-6263977-B1 OR US-10412873-B2 OR US-10405476-B2 OR US-10368474-B2 OR US-11234354-B2 OR US-11197408-B2 OR US-10645857-B2 OR US-4519460-A OR US-7921931-B2 OR US-9686899-B2 OR US-9635797-B2 OR US-11191204-B2 OR US-10492353-B2 OR US-10813265-B2 OR US-9615500-B2 OR US-10820470-B2 OR US-10820471-B2 OR US-10959367-B2 OR US-10602653-B2 OR US-10412875-B2 OR US-10624253-B2 OR US-10750653-B2 OR US-10827665-B2 OR US-11019762-B2 OR US-11140805-B2 OR US-11206753-B2).did. AND USPT.dbnm.) OR ((DE-102009044898-A1 OR DE-102016220489-A1 OR DE-822734-C OR DE-841068-C OR FR-2632484-A1 OR FR-660688-A OR KR-					

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		101342396-B1 OR KR-101423669-B1).did. AND FPRS.dbnm.) OR ((DE-102017121152-A1 OR EP-3501248-A1 OR FI-96912-B OR US-20140041563-A1 OR US-20150012189-A1 OR US-20150053439-A1 OR US-20160134844-A1 OR US-20180070523-A1 OR US-20180116095-A1 OR US-20180295769-A1 OR US-20190021211-A1 OR US-20190150350-A1 OR US-5653292-A OR US-5709271-A OR WO-2012125109-A1 OR WO-2019010239-A1).did. AND DWPI.dbnm.) OR ((KR-102166055-B1 OR KR-102302749-B1 OR KR-200315786-Y1 OR KR-20140104720-A).did. AND FTDB.dbnm.)					
L32	17	L31 AND electromagnetic	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 06:14 PM
L33	18	("4825958" | "5511623" | "6076611" | "6112827" | "8567517" | "8657026" | "20020017090" | "20020017389" | "20080093093" | "20080308020" | "20110120357" | "20110284252" | "20110315410" | "20120298388" | "20140069670" | "20140196996" | "20150156955" | "20150230391").pn. OR ("10506756").urpn. AND (PGPB | USPT | USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/18 06:18 PM
L35	5	L31 AND rate WITH rotation	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD,	OR	ON	ON	2022/07/18 06:31 PM

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			DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L36	6	L31 AND speed WITH rotation	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 06:32 PM
L37	4	L31 AND (rate speed) WITH actuation	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 06:33 PM
L38	0	L33 AND (rate speed) WITH actuation	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 06:34 PM
L39	1	L33 AND (rate speed) WITH (rotation actuation)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 06:34 PM
L40	297	L26 AND (rate speed) WITH (rotation actuation)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 09:12 PM
L41	4	L33 AND sensor	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/18 11:13 PM
L42	3	("20030024450"|"5065681"|"9031749").PN.	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/10 12:23 PM
L43	3	("20030024450" OR "5065681" OR "9031749").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/23 02:40 PM
L44	5	("9301439" "5065681" "9031749" "8857530"	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/23 02:42 PM

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		"6112827").pn.					
L46	2	("20150230391"|"20030024450").PN.	(US-PGPUB; USPAT)	OR	OFF	OFF	2023/01/23 02:44 PM
L47	1	("8573319").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/24 04:39 PM
L48	2	"20150230391"	(US-PGPUB; USPAT)	OR	ON	ON	2023/02/17 11:52 AM
L49	1	"9031759"	(US-PGPUB; USPAT)	OR	ON	ON	2023/02/17 12:00 PM

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N1	1105	a01b49/00,027.cpc.	(US-PGPUB; USPAT)	OR	OFF	OFF	2023/03/24 10:01 PM
N2	40	a01b63/045.cpc.	(US-PGPUB; USPAT)	OR	OFF	OFF	2023/03/24 10:02 PM
N3	10	((ground soil) AND sens$3 AND angle AND (cylinder actuator) AND tool ADJ bar).clm.	(US-PGPUB; USPAT)	OR	OFF	OFF	2023/03/24 10:02 PM

PTO/SB/08a (01-22)
Approved for use through 05/31/2024. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16470472
Filing Date	2019-06-17
First Named Inventor	Benjamin Anson FANSHIER
Art Unit	3671
Examiner Name	Jessica H. Lutz
Attorney Docket Number	US1640/WO-US

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.H.L/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16470472
	Filing Date	2019-06-17
	First Named Inventor	Benjamin Anson FANSHIER
	Art Unit	3671
	Examiner Name	Jessica H. Lutz
	Attorney Docket Number	US1640/WO-US

	1	BRAZILIAN PATENT OFFICE, Third Party Petition for related BR Application No. BR112019010534-4, dated 17 JAN 2023, 88 pages (including translation).	X
	2	BRAZILIAN PATENT OFFICE, Office Action (with translation) for related BR Application No. BR112019010534-4, dated 14 JAN 2023, 16 pages.	☒

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature	/JESSICA H LUTZ/	Date Considered	03/24/2023

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.H.L/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16470472
	Filing Date	2019-06-17
	First Named Inventor	Benjamin Anson FANSHIER
	Art Unit	3671
	Examiner Name	Jessica H. Lutz
	Attorney Docket Number	US1640/WO-US

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Nathan E. Whitlock/	Date (YYYY-MM-DD)	2023-02-21
Name/Print	Nathan E. Whitlock	Registration Number	65744

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.H.L/

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.H.L/

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
AGCO - Exhibit No. 2005
IPR2024-001459
Page 812

Bibliographic Data

Application No: 16/470,472

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☐ No ☐ Met After Allowance

Verified and Acknowledged: /JESSICA H LUTZ/ (Examiner's Signature) | (Initials)

Title: IMPLEMENT CONTOURING TOOLBAR

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
06/17/2019	172	3671	US1640/WO-US
RULE			

APPLICANTS

AGCO Corporation, Duluth, GA, UNITED STATES

INVENTORS

Benjamin Anson Fanshier, Hesston, KS, UNITED STATES

Rex Schertz, Hesston, KS, UNITED STATES

CONTINUING DATA

This application is a 371 of PCT/IB2017/001298 10/26/2017

PCT/IB2017/001298 has PRO of 62435118 12/16/2016

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

12/07/2019

STATE OR COUNTRY

UNITED STATES

ADDRESS

AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston, KS 67062
UNITED STATES

FILING FEE RECEIVED

$1,580

OK TO ENTER: /J.H.L/

Amendment Under 37 C.F.R. § 1.116
Expedited Procedure - Art Unit 3671

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors: Fanshier, Benjamin Anson et al.	Confirmation No.: 1653
Applicant: AGCO Corporation	Art Unit: 3671
Application No.: 16/470,472	Examiner: LUTZ, JESSICA H
Filing Date: June 17, 2019	Atty. Docket: US1640/WO-US

Title: **IMPLEMENT CONTOURING TOOLBAR**

AMENDMENT & RESPONSE TO FINAL OFFICE ACTION UNDER 37 C.F.R. § 1.116

Mail Stop AF
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Commissioner:

In reply to the Final Office Action dated January 31, 2023, Applicant submits the following Amendment and Remarks.

Proposed Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks begin on page 6 of this paper.

United States Patent and Trademark Office

Office of the Chief Financial Officer

Document Code:WFEE

User :Tim Cole

Sale Accounting Date:03/29/2023

Sale Item Reference Number	Effective Date
16470472	02/21/2023

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I20233S957316917	1806	SUBMISSION- INFORMATION DISCLOSURE STMT	$260.00	Deposit Account

To: patents@agcocorp.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 88988

Mar 29, 2023 03:37:48 AM

Dear PAIR Customer:

AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston, KS 67062
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 88988 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

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Application	Document	Mailroom Date	Attorney Docket No.
16470472	NOA	03/29/2023	US1640/WO-US
	1449	03/29/2023	US1640/WO-US

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

UNITED STATES
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P.O. Box 1450
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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/470,472	**04/19/2023 12:22:43 PM ET**	**US1640/WO-US-2**

Title of Invention

IMPLEMENT CONTOURING TOOLBAR

Application Information

APPLICATION TYPE	Utility - U.S. National Stage under 35 USC 371	PATENT #	-
CONFIRMATION #	1653	FILED BY	Wontu Bivins
PATENT CENTER #	61946154	FILING DATE	06/17/2019
CUSTOMER #	88988	FIRST NAMED INVENTOR	Benjamin Anson Fanshier
INTL. APPLICATION #	-	INTL. FILING DATE	-
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Nathan Whitlock

Documents

TOTAL DOCUMENTS: 2

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
US1640WOUS-2_IssueFee.pdf	1	Issue Fee Payment (PTO-85B)	135 KB
US1640 signed aia0001 declarations.pdf	2	Oath or Declaration filed	108 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
US1640WOUS-2_IssueFee.pdf	24BF4FDF7DBE450AEE8EFBB7B8A099872AC036470D6F178A

	B1744F008FCE317CBA5EAE22F01276E8F2BE7F81A64B0B2F2BCDC8AFB174AD1CD9C99F490FDD76BF
US1640 signed aia0001 declarations.pdf	404537B8142DFC89CB83E8896B217F43011423CB398DED65040D5C85A26F308828806BE800C29ADD56934E2B6DEADEA964B8ACDCE38D11F6088E23D91BDA5CD0

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

88988 7590 03/29/2023

AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston, KS 67062

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/470,472	06/17/2019	Benjamin Anson Fanshier	US1640/WO-US	1653

TITLE OF INVENTION: IMPLEMENT CONTOURING TOOLBAR

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	06/29/2023

EXAMINER	ART UNIT	CLASS-SUBCLASS
LUTZ, JESSICA H	3671	172-004000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: AGCO Corporation

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Duluth, GA

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ☒ Corporation or other private group entity ❑ Government

4a. Fees submitted: ☒ Issue Fee ❑ Publication Fee (if required)

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

☒ Electronic Payment via Patent Center or EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. 010442

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

❑ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

❑ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Nathan E. Whitlock/ Date April 19, 2023

Typed or printed name Nathan E. Whitlock Registration No. 65744

PTOL-85 Part B (08-18) Approved for use through 01/31/2020 OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
AGCO - Exhibit No. 2005
IPR2024-001459
Page 819

PTO/AIA/01 (06-12)
Approved for use through 05/31/2024. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	Implement Contouring Toolbar

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 16/470,472

filed on October 26, 2017.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Benjamin Anson Fanshier Date (Optional) :

Signature:

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

A Federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with an information collection subject to the requirements of the Paperwork Reduction Act of 1995, unless the information collection has a currently valid OMB Control Number. The OMB Control Number for this information collection is 0651-0032. Public burden for this form is estimated to average 1 minute per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. Send comments regarding this burden estimate or any other aspect of this information collection, including suggestions for reducing this burden to the Chief Administrative Officer, United States Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450 or email InformationCollection@uspto.gov. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS.** If filing this completed form by mail, send to: **Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/01 (06-12)
Approved for use through 05/31/2024. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	Implement Contouring Toolbar

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 16/470,472 filed on October 26, 2017.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Rex Schertz Date (Optional): 6/14/23

Signature: Rex Schertz

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

A Federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with an information collection subject to the requirements of the Paperwork Reduction Act of 1995, unless the information collection has a currently valid OMB Control Number. The OMB Control Number for this information collection is 0651-0032. Public burden for this form is estimated to average 1 minute per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. Send comments regarding this burden estimate or any other aspect of this information collection, including suggestions for reducing this burden to the Chief Administrative Officer, United States Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450 or email InformationCollection@uspto.gov. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS.** If filing this completed form by mail, send to: **Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
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ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/470,472	04/19/2023 12:22:43 PM ET	US1640/WO-US-2

Title of Invention

IMPLEMENT CONTOURING TOOLBAR

Application Information

APPLICATION TYPE	Utility - U.S. National Stage under 35 USC 371	PATENT #	-
CONFIRMATION #	1653	FILED BY	Wontu Bivins
PATENT CENTER #	61946154	AUTHORIZED BY	Nathan Whitlock
CUSTOMER #	88988	FILING DATE	06/17/2019
INTL. APPLICATION #	-	INTL. FILING DATE	-
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Benjamin Anson Fanshier

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
DA / 010442	E20234IC23558912	Wontu Bivins

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
1501	UTILITY ISSUE FEE	1200.00	1	1200.00
			TOTAL AMOUNT:	$1,200.00

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16470472
Filing Date	2019-06-17
First Named Inventor	Benjamin Anson FANSHIER
Art Unit	3671
Examiner Name	Jessica H. Lutz
Attorney Docket Number	US16/40/WO/US-2

U.S.PATENTS

Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
Change(s) applied to document, /M.H.E./ 3/31/2023	1	9301439	B2	2016-04-05	VADERSTAD HOLDING AB Gilstring	cited in 3rd party submittal for BR Application

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UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/470,472	06/06/2023	11665989	US1640/WO-US-2	1653

88988 7590 05/17/2023

AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston, KS 67062

ISSUE NOTIFICATION

The projected patent number and issue date are specified above. The patent will issue electronically. The electronically issued patent is the official patent grant pursuant to 35 U.S.C. § 153. The patent may be accessed on or after the issue date through Patent Center at https://patentcenter.uspto.gov/. The patent will be available in both the public and the private sides of Patent Center. Further assistance in electronically accessing the patent, or about Patent Center, is available by calling the Patent Electronic Business Center at 1-888-217-9197.

The USPTO is implementing electronic patent issuance with a transition period, during which period the USPTO will mail a ceremonial paper copy of the electronic patent grant to the correspondence address of record. Additional copies of the patent (i.e., certified and presentation copies) may be ordered for a fee from the USPTO's Certified Copy Center at https://certifiedcopycenter.uspto.gov/index.html. The Certified Copy Center may be reached at (800)972-6382.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 647 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Patents Stakeholder Experience (OPSE), Stakeholder Support Division (SSD) at (571)-272-4200.

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
AGCO - Exhibit No. 2005
IPR2024-001459
Page 825

INVENTOR(s) (Please see PAIR WEB site http://pair.uspto.gov for additional inventors):

Benjamin Anson Fanshier, Hesston, KS;
Rex Schertz, Hesston, KS;

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

AGCO Corporation, Duluth, GA;

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AGCO - Exhibit No. 2005
IPR2024-001459
Page 826

TO: patents@agcocorp.com
FROM: noreply@uspto.gov
CC: patentcenter_eofficeaction@uspto.gov
SUBJECT: USPTO: Patent Electronic System - Correspondence Notification for Customer Number 88988

Thu May 18 05:53:20 EDT 2023

Dear Patent Center Customer:

Correspondence Address:

AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston,KANSAS,67062
UNITED STATES

This is a courtesy notification regarding the following USPTO patent application(s) associated with your Customer Number, 88988, that have new outgoing correspondence. This correspondence is now available for viewing in Patent Center.

The official date of notification of the outgoing correspondence will be indicated on the form (e.g., PTOL-90) accompanying the correspondence.

Disclaimer:
The list of documents shown below are provided as a courtesy and is not part of the official file wrapper. The content of the images shown in the Image File Wrapper is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
16470472	ISSUE.NTF	05/17/2023	US1640/WO-US-2

To view your correspondence online, please sign in to Patent Center and then select Workbench/View correspondence. To update your email address(es), select Manage/Manage customer numbers.

If you have any questions, please contact the Patent Electronic Business Center (EBC) at ebc@uspto.gov or 866-217-9197 Monday – Friday, 6 a.m. to midnight ET.

Please do not reply to this email as it was sent from an unmonitored mailbox.

Sincerely,

The Patent Center Team

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address : COMMISSIONER FOR PATENTS
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Alexandria, VA 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.
16/470,472	06-JUN-23	11665989

AGCO Corporation, IP Legal Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston, KS 67062

EGRANT NOTIFICATION

Your electronic patent grant (eGrant) is now available, which can be accessed via Patent Center at https://patentcenter.uspto.gov

The electronic patent grant is the official patent grant under 35 U.S.C. 153. For more information, please visit https://www.uspto.gov/electronicgrants

TO: patents@agcocorp.com
FROM: noreply@uspto.gov
CC: patentcenter_eofficeaction@uspto.gov
SUBJECT: USPTO: Patent Electronic System - Correspondence Notification for Customer Number 88988

Tue Jun 06 05:35:26 EDT 2023

Dear Patent Center Customer:

Correspondence Address:

AGCO Corporation, IP Legal
Jeff Ellsworth
420 W. Lincoln Blvd.
Hesston,KANSAS,67062
UNITED STATES

This is a courtesy notification regarding the following USPTO patent application(s) associated with your Customer Number, 88988, that have new outgoing correspondence. This correspondence is now available for viewing in Patent Center.

The official date of notification of the outgoing correspondence will be indicated on the form (e.g., PTOL-90) accompanying the correspondence.

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Application	Document	Mailroom Date	Attorney Docket No.
16470472	EGRANT.NTF	06/06/2023	US1640/WO-US-2

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If you have any questions, please contact the Patent Electronic Business Center (EBC) at ebc@uspto.gov or 866-217-9197 Monday – Friday, 6 a.m. to midnight ET.

Please do not reply to this email as it was sent from an unmonitored mailbox.

Sincerely,

The Patent Center Team

Trials@uspto.gov
571-272-7822

Paper No. 3

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

STARA S.A.-INDÚSTRIA DE IMPLEMENTOS AGRÍCOLAS,
Petitioner,

v.

AGCO CORPORATION,
Patent Owner.

IPR2024-01459
Patent 11,665,989

Mailed: September 30, 2024

Before Steven M. Amitrani, *Trial Paralegal*

NOTICE OF FILING DATE ACCORDED TO PETITION AND TIME FOR FILING PATENT OWNER PRELIMINARY RESPONSE

The petition for *inter partes* review filed in the above proceeding has been accorded the filing date of September 19, 2024.

Patent Owner may file a preliminary response to the petition no later than three months from the date of this notice. The preliminary response is limited to setting forth the reasons why the requested review should not be instituted. Patent Owner may also file an election to waive the preliminary

response to expedite the proceeding. For more information, please consult the Office Patent Trial Practice Guide, 77 Fed. Reg. 48756 (Aug. 14, 2012), which is available on the Board Web site at http://www.uspto.gov/PTAB.

Patent Owner is advised of the requirement to submit mandatory notice information under 37 C.F.R. § 42.8(a)(2) within 21 days of service of the petition. Mandatory notices include identifying any other judicial or administrative matter that would affect, or be affected by, a decision in the proceeding. 37 C.F.R. § 42.8(b)(2). Such administrative matters include requests for certificates of correction.

The parties are encouraged to use the heading on the first page of this Notice for all future filings in the proceeding.

The parties are advised that under 37 C.F.R. § 42.10(c), recognition of counsel *pro hac vice* requires a showing of good cause. The parties are authorized to file motions for *pro hac vice* admission under 37 C.F.R. § 42.10(c). Such motions shall be filed in accordance with the "Order -- Authorizing Motion *for Pro Hac Vice* Admission" in Case IPR2013-00639, Paper 7, a copy of which is available on the Board Web site under "Representative Orders, Decisions, and Notices."

The parties are reminded that unless otherwise permitted by 37 C.F.R. § 42.6(b)(2), all filings in this proceeding must be made electronically in the Patent Trial Appeal Case Tracking System (P-TACTS), accessible from the Board Web site at http://www.uspto.gov/PTAB.

To file documents, users must first obtain a user ID by registering with MyUSPTO. Information regarding how to register with MyUSPTO and use P-TACTS is available at the Board Web site at

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https://www.uspto.gov/patents/ptab/patent-trial-and-appeal-case-tracking-system-p-tacts.

The parties may request a conference call as needed. Any email requesting a conference call with the Board should: (a) copy all parties, (b) indicate generally the relief being requested or the subject matter of the conference call, (c) include multiple times when all parties are available, (d) state whether the opposing party opposes any relief requested, and (e) if opposed, either certify that the parties have met and conferred telephonically or in person in an attempt to reach agreement, or explain why such meet and confer did not occur. The email may not contain substantive argument and, unless otherwise authorized, may not include attachments. *See* Trial Practice Guide at 9–10. If practicable, in order to ensure emails are consistent with the above, the parties should send a single, joint email that includes items (a)–(e).

If there are any questions pertaining to this notice, please contact the Patent Trial and Appeal Board at trials@uspto.gov or 571-272-7822.

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IPR2024-01459
Patent 11,665,989

PETITIONER:

Brian A. Tollefson
TOLLEFSON IP
brian@tollefsonip.com

Terry Kramer
KRAMERAMADO, P.C.
terry@krameramado.com

PATENT OWNER:

AGCO CORPORATION, IP LEGAL
JEFF ELLSWORTH
420 W. LINCOLN BLVD.
HESSTON KS 67062

Stara S.A.-Indústria De Implementos Agrícolas v. AGCO Corporation
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NOTICE CONCERNING ALTERNATIVE DISPUTE RESOLUTION (ADR)

The Patent Trial and Appeal Board (PTAB) strongly encourages parties who are considering settlement to consider alternative dispute resolution as a means of settling the issues that may be raised in an AIA trial proceeding. Many AIA trials are settled prior to a Final Written Decision. Those considering settlement may wish to consider alternative dispute resolution techniques early in a proceeding to produce a quicker, mutually agreeable resolution of a dispute or to at least narrow the scope of matters in dispute. Alternative dispute resolution has the potential to save parties time and money.

Many non-profit organizations, both inside and outside the intellectual property field, offer alternative dispute resolution services. Listed below are the names and addresses of several such organizations. The listings are provided for the convenience of parties involved in cases before the PTAB; the PTAB does not sponsor or endorse any particular organization's alternative dispute resolution services. In addition, consideration may be given to utilizing independent alternative dispute resolution firms. Such firms may be located through a standard keyword Internet search.

CPR INSTITUTE FOR DISPUTE RESOLUTION	AMERICAN INTELLECTUAL PROPERTY LAW ASSOCIATION (AIPLA)	AMERICAN ARBITRATION ASSOCIATION (AAA)	WORLD INTELLECTUAL PROPERTY ORGANIZATION (WIPO)	AMERICAN BAR ASSOCIATION (ABA)
Telephone: (212) 949-6490	Telephone: (703) 415-0780	Telephone: (212) 484-3266	Telephone: 41 22 338 9111	Telephone : (202) 662-1000
Fax: (212) 949-8859	Fax: (703) 415-0786	Fax: (212) 307-4387	Fax: 41 22 733 5428	N/A
575 Lexington Ave	241 18th Street, South, Suite 700	140 West 51st Street	34, chemin des Colombettes	1050 Connecticut Ave, NW
New York, NY 10022	Arlington, VA 22202	New York, NY 10020	CH-1211 Geneva 20, Switzerland	Washington D.C. 20036
www.cpradr.org	www.aipla.org	www.adr.org	www.wipo.int	www.americanbar.org

If parties to an AIA trial proceeding consider using alternative dispute resolution, the PTAB would like to know whether the parties ultimately decided to engage in alternative dispute resolution and the reasons why or why not. If the parties actually engage in alternative dispute resolution, the PTAB would be interested to learn what mechanism (e.g., arbitration,

mediation, etc.) was used and the general result. Such a statement from the parties is not required but would be helpful to the PTAB in assessing the value of alternative dispute resolution to parties involved in AIA trial proceedings. To report an experience with ADR, please forward a summary of the particulars to the following email address: PTAB_ADR_Comments@uspto.gov

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The United States Patent and Trademark Office
PATENT TRIAL AND APPEAL BOARD

A petition has been filed in Patent Number 11,665,989, Application Number 16/470,472 on 09/19/24 (Date).

The Case Number is IPR2024-01459.
(IPR, CBM, PGR, DER #)

To view the documents filed in this petition, go to https://ptab.uspto.gov.

Use the Search PTAB tab and enter the Patent Number or the Trial or Case Number and select the Search button.

Questions regarding this notice should be directed to the Patent Trial and Appeal Board at 571-272-7822.