



- (51) International Patent Classification:
A01F 15/04 (2006.01) A01F 15/08 (2006.01)
- (21) International Application Number:
PCT/IB2024/054950
- (22) International Filing Date:
22 May 2024 (22.05.2024)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
63/506,628 07 June 2023 (07.06.2023) US
- (71) Applicant: AGCO CORPORATION [US/US]; 4205
RIVER GREEN PARKWAY, DULUTH, Georgia 30096
(US).
- (72) Inventors: CHERNEY, Patrick L; c/o AGCO Corpora-
tion, 420 W Lincoln Blvd, Hesston, Kansas 67062 (US).

BOOTON, Kelly B; c/o AGCO Corporation, 420 W Lin-
coln Blvd, Hesston, Kansas 67062 (US). **BOLLINGER,**
Shane A; c/o AGCO Corporation, 420 W Lincoln Blvd,
Hesston, Kansas 67062 (US).

(81) Designated States (*unless otherwise indicated, for every
kind of national protection available*): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG,
KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY,
MA, MD, MG, MK, MN, MU, MW, MX, MY, MZ, NA,
NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO,
RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH,
TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS,
ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every
kind of regional protection available*): ARIPO (BW, CV,

(54) Title: DOUBLE BALER WITH EXTENDED LENGTH CHAMBER

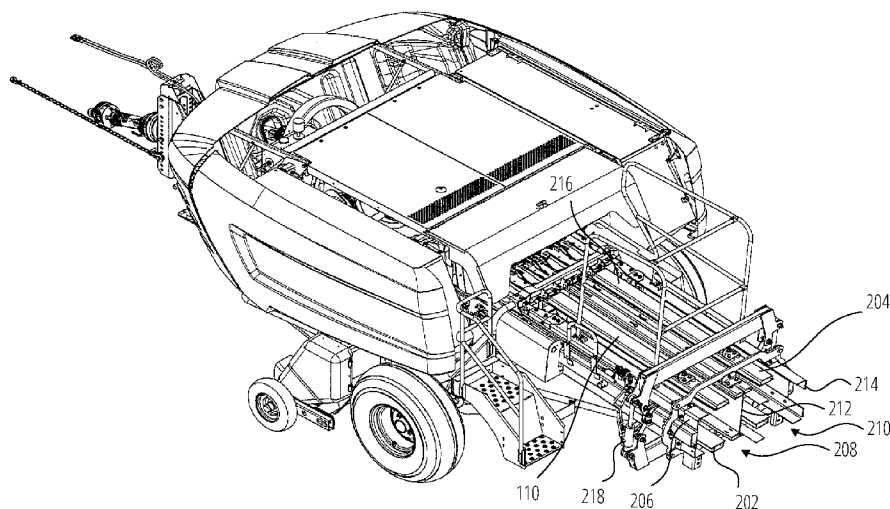


FIG. 2

(57) Abstract: An agricultural baler has a pickup assembly configured to take cut plant material from the ground and move the plant material to a baling chamber and compress the plant material in the baling chamber with a reciprocating plunger. The baling chamber is formed with a floor, a roof, opposing side walls, and a dividing partition between the opposing side walls forming a first bale-forming compartment and a second bale-forming compartment such that the compressed crop material pushed into the baling chamber is simultaneously formed into a first bale in the first bale-forming compartment on one side of the dividing partition and a second bale in the second bale-forming compartment on an opposite side of the dividing partition. The baling chamber is configured such that the second bale-forming compartment is longer than the first bale-forming compartment.



GH, GM, KE, LR, LS, MW, MZ, NA, RW, SC, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, ME, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

- *with international search report (Art. 21(3))*
- *in black and white; the international application as filed contained color or greyscale and is available for download from PATENTSCOPE*

DOUBLE BALER WITH EXTENDED LENGTH CHAMBER

BACKGROUND

Field

[0001] This disclosure relates to agricultural harvesting machines such as balers and, more particularly, to a baler that simultaneously forms multiple bales of crop material.

Description of Related Art

[0002] Conventional square hay balers include a bale forming chamber and a reciprocating plunger that slides into and out of the chamber. “Square” bales are often preferred in that the square-shouldered bales facilitate stacking, delivery and use and, as used herein, square bales means bales having square shoulders. As the chamber receives loose hay material, the plunger slides into the chamber during a compaction stroke to compress the loose hay material into the form of a bale. Such balers typically include a drive train that transmits power to the reciprocating plunger. FIG. 1 shows a typical prior art square baler.

[0003] Attempts to improve baling efficiency have included the production larger balers that produce very large, high-density bales. These large square bales are heavy and impossible to move by hand, making them undesirable for the small hobby farmer. Attempts have been made to use larger balers to produce bales of a reduced size in pairs. U.S. Pat. No. 3,099,203 to Klemm et al. and U.S. Pat. No. 10,869,428 to Grady show attempts at double balers.

[0004] Double balers face a unique challenge when trying to drop bales behind the baler. Dropping two bales from the chamber at the same time in side-by-side manner makes the task of picking up the bales more difficult and is not preferred by most farmers.

BRIEF SUMMARY

[0005] In one aspect the invention is directed to an agricultural baler having a pickup assembly configured to take cut plant material from the ground and move the plant material to a baling chamber and compress the plant material in the baling chamber with a reciprocating plunger. The baling chamber is formed with a floor, a roof, opposing side walls, and a dividing partition between the opposing side walls forming a first bale-forming compartment and a second bale-forming compartment such that the compressed crop material pushed into the

baling chamber is simultaneously formed into a first bale in the first bale-forming compartment on one side of the dividing partition and a second bale in the second bale-forming compartment on an opposite side of the dividing partition. The baling chamber is configured such that the second bale-forming compartment is longer than the first bale-forming compartment.

[0006] Other technical features may be readily apparent to one skilled in the art from the following figures, descriptions, and claims. This summary is provided to introduce concepts in simplified form that are further described below in the Detailed Description. This summary is not intended to identify key features or essential features of the disclosed or claimed subject matter and is not intended to describe each disclosed embodiment or every implementation of the disclosed or claimed subject matter. Specifically, features disclosed herein with respect to one embodiment may be equally applicable to another. Further, this summary is not intended to be used as an aid in determining the scope of the claimed subject matter. Many other novel advantages, features, and relationships will become apparent as this description proceeds. The figures and the description that follow more particularly exemplify illustrative embodiments.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0007] To easily identify the discussion of any particular element or act, the most significant digit or digits in a reference number refer to the figure number in which that element is first introduced.

[0008] FIG. 1 is a side elevation view of an example baler machine configured to receive loose plant material and shape and secure the material into a bale;

[0009] FIG. 2 illustrates a perspective view of a baler in accordance with one embodiment; and

[0010] FIG. 3 illustrates a plan view of the baling chamber of the baler of FIG. 2.

DETAILED DESCRIPTION

[0011] The following description provides specific details of embodiments. However, a person of ordinary skill in the art will understand that the embodiments of the disclosure may be practiced without employing many such specific details. Indeed, the embodiments of the disclosure may be practiced in conjunction with conventional techniques employed in the

industry. In addition, the description provided below does not include all the elements that form a complete structure or assembly. Only those process acts and structures necessary to understand the embodiments of the disclosure are described in detail below. Additional conventional acts and structures may be used. The drawings accompanying the application are for illustrative purposes only, and are thus not drawn to scale.

[0012] As used herein, the singular forms following “a,” “an,” and “the” are intended to include the plural forms as well, unless the context clearly indicates otherwise. As used herein, the term “may” with respect to a material, structure, feature, or method act indicates that such is contemplated for use in implementation of an embodiment of the disclosure, and such term is used in preference to the more restrictive term “is” so as to avoid any implication that other compatible materials, structures, features, and methods usable in combination therewith should or must be excluded. As used herein, the term “configured” refers to a size, shape, material composition, and arrangement of one or more of at least one structure and at least one apparatus facilitating operation of one or more of the structure and the apparatus in a predetermined way.

[0013] As used herein, any relational term, such as “first,” “second,” “top,” “bottom,” “upper,” “lower,” “above,” “beneath,” “side,” etc., is used for clarity and convenience in understanding the disclosure and accompanying drawings, and does not connote or depend on any specific preference or order, except where the context clearly indicates otherwise.

[0014] As used herein, the term “about” used in reference to a given parameter is inclusive of the stated value and has the meaning dictated by the context (e.g., it includes the degree of error associated with measurement of the given parameter, as well as variations resulting from manufacturing tolerances, etc.). As used herein, the term “substantially” in reference to a given parameter, property, or condition means and includes to a degree that one skilled in the art would understand that the given parameter, property, or condition is met with a small degree of variance, such as within acceptable manufacturing tolerances. By way of example, depending on the particular parameter, property, or condition that is substantially met, the parameter, property, or condition may be at least 90.0% met, at least 95.0% met, at least 99.0% met, or even at least 99.9% met.

[0015] Referring to FIG. 1, an example agricultural baler 102 is shown into which embodiments of the present invention may be incorporated. Although the example baler 102 is a towed square baler, it will be appreciated that embodiments of the present invention may be

incorporated into other types of balers (e.g., self-propelled) with few or no changes. Broadly, the baler 102 may be configured to move over a field and collect previously cut plant material and to compress, shape, and secure the collected plant material into a plurality of bales. The baler 102 may include a pickup assembly 104, a stuffer chute assembly 106, a reciprocating plunger 108, and a baling (or compression) chamber 110. Additionally, the baler 102 may be hitched to a towing vehicle (not shown) by a tongue 112, and power for operating the various mechanisms (e.g., the reciprocating plunger 108) of the baler 102 may be supplied by a power take-off of the towing vehicle.

[0016] The pickup assembly 104 may be configured to collect the cut plant material from the field. In one implementation, the pickup assembly 104 may include a pair of ground wheels 114 that support the pickup assembly 104 as the baler 102 moves over the field. The stuffer chute assembly 106 may be configured to direct the collected plant material into position for incorporation into a bale. In one implementation, the stuffer chute assembly 106 may include a charge-forming duct 116 extending from an inlet opening adjacent to the pickup assembly 104 to an outlet opening into the baling chamber 110.

[0017] The reciprocating plunger 108 may be configured to compress the plant material from the charge-forming duct 116 into a growing bale. The plunger 108 is hydraulically moved rearward to compress the plant material received in the baling chamber 110 from the stuffer chute assembly 106 against the rear of the previous bale formed in the baling chamber 110. In one implementation, the plunger 108 may be configured to reciprocate within the baling chamber 110 in repeating compression and retraction strokes across the outlet opening of the charge-forming duct 116. As the plunger 108 retracts, the outlet opening is uncovered and an additional flake, charge, or other subunit of plant material enters the baling chamber 110, and as the plunger 108 contracts the outlet opening is covered and the additional subunit of plant material is compressed into the growing bale.

[0018] Turning now to FIGS. 2 and 3, the baling chamber 110 is formed with a floor 202, a roof 204 and opposing side walls 206. The reciprocating plunger 108 may be configured to compress the plant material from the charge-forming duct 116 into the space between the floor 202, the roof 204 and the side walls 206 of the baling chamber 110. As in known double balers, the plunger 108 is hydraulically moved rearward to compress the plant material received in the baling chamber 110 from the stuffer chute assembly 106 such that the plunger 108 pushes the crop material against and past a dividing partition 212 which extends vertically in the baling

chamber 110 between the floor 202 and the roof 204 in a plane parallel with the side walls 206 on the outer sides of the baling chamber 110. Desirably, a forward end of the dividing partition 212 is a crop splitting knife.

[0019] The compressed crop material split by movement of the plunger 108 relative to the dividing partition 212 is pushed into separate side-by-side compartments comprising a first bale-forming compartment 208 and a second bale-forming compartment 210 of the baling chamber 110. In one embodiment, the dividing partition 212 extends rearward and is generally in a plane parallel with the side walls 206 of the baling chamber 110. Desirably, the dividing partition 212 extends to a discharge end 214 of the baling chamber 110. Thus, the compressed crop material pushed into the side-by-side first and second bale-forming compartments 208 and 210 is simultaneously formed into first and second bales, with the first bale formed in the first bale-forming compartment 208 on one side of the dividing partition 212 and the second bale formed in the second bale-forming compartment 210 on the other side of the dividing partition 212.

[0020] As is known in the art, the floor 202, roof 204, and side walls 206 of the baling chamber 110 are formed by elongate rails 216 extending from fore to aft along the baling chamber 110 to form a compression chamber controlled by hydraulic compression cylinders 218. Desirably, the compression cylinders 218 squeeze the rails 216 on the top, bottom and outside sides of the first and second bales to achieve the desired weight and size of each bale. After the first and second bales reach the desired weight and size, the first and second bales are tied by a suitable knotter mechanism (not shown) as would be understood by one skilled in the art and expelled out the discharge end 214 of the baling chamber 110.

[0021] According to the invention, the baling chamber 110 is configured such that the second bale-forming compartment 210 is longer than the first bale-forming compartment 208. In the illustrated embodiment, at least some of the rails 216 forming the floor 202 that support the second bale in the second bale-forming compartment 210 extend in a rearward direction a greater distance than the rails 216 forming the floor 202 of the first bale-forming compartment 208. Rails 216 forming the outside side wall 206 and the roof 204 forming the second bale-forming compartment 210 may also be longer than the rails 216 forming the outside side wall 206 and roof 204 forming the first bale-forming compartment 208. The longer rails 216 forming the second bale-forming compartment 210 hold the second bale in the bale baling chamber 110 for a greater amount of time than the shorter rails 216 of the first bale-forming

compartment 208. Accordingly, after the first and second bales have been formed in the baling chamber 110 and tied with the knotter mechanism, the first bale drops to the ground from the first bale-forming compartment 208 at a first time, and the second bale drops from the second bale-forming compartment 210 at a second time, with the second time being after the first time, because of the extended length of the second bale-forming compartment 210. Thus, the first and second bales are dropped from the discharge end 214 of the baling chamber 110 at staggered times as the baler 102 moves along the field such that the first and second bales drop in a longitudinally-spaced relationship with each other on the field for subsequent collection.

[0022] The foregoing has broadly outlined some of the more pertinent aspects and features of the present invention. These should be construed to be merely illustrative of some of the more prominent features and applications of the invention. Other beneficial results can be obtained by applying the disclosed information in a different manner or by modifying the disclosed embodiments. Accordingly, other aspects and a more comprehensive understanding of the invention may be obtained by referring to the detailed description of the exemplary embodiments taken in conjunction with the accompanying drawings.

CLAIMS

What is claimed is:

1. An agricultural baler 102 having a pickup assembly 104 configured to take cut plant material from the ground and move the plant material to a baling chamber 110 and compress the plant material in the baling chamber with a reciprocating plunger 108, the baling chamber being formed with a floor 202, a roof 204 and opposing side walls 206, and a dividing partition 212 between the opposing side walls forming a first bale-forming compartment 208 and a second bale-forming compartment 210 such that the compressed crop material pushed into the baling chamber is simultaneously formed into a first bale in the first bale-forming compartment on one side of the dividing partition and a second bale in the second bale-forming compartment on an opposite side of the dividing partition, wherein the baling chamber 110 is configured such that the second bale-forming compartment 210 is longer than the first bale-forming compartment 208.
2. The agricultural baler of claim 1 wherein the floor, roof and side walls of the baling chamber are formed from elongate rails 216, and at least some of the rails forming a portion of the floor in the second bale-forming compartment extend a greater distance in a rearward direction than the rails forming a portion of the floor in the first bale-forming compartment.
3. The agricultural baler of claim 2 wherein at least some of the rails forming the outside side wall and the roof forming the second bale-forming compartment are longer than the rails forming the outside side wall and roof forming the first bale-forming compartment.
4. The agricultural baler of claim 2 wherein the rails forming the second bale-forming compartment hold the second bale in the baling chamber for a greater amount of time than the rails of the first bale-forming compartment such that the first bale drops to the ground from the first bale-forming compartment at a first time, and the second bale drops from the second bale-forming compartment at a second time, with the second time being after the first time.
5. The agricultural baler of claim 4 the first and second bales are dropped from the baling chamber at staggered times as the baler moves along the field such that the first and second bales drop in a longitudinally spaced relationship with each other on the field.

6. The agricultural baler of claim 1 wherein the dividing partition extends from the roof to the floor of the baling chamber and is intermediate the side walls of the baling chamber such that

7. The agricultural baler of claim 1 wherein the dividing partition is in a plane parallel with the side walls of the baling chamber.

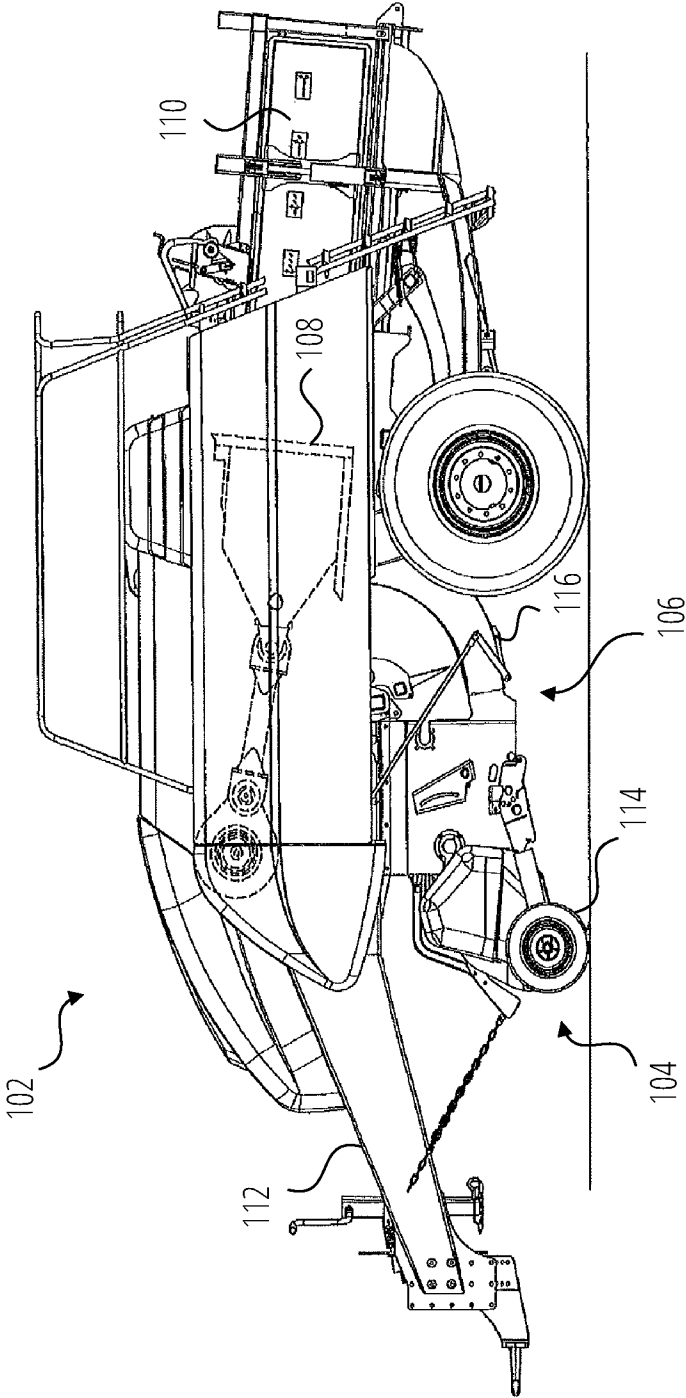


FIG. 1

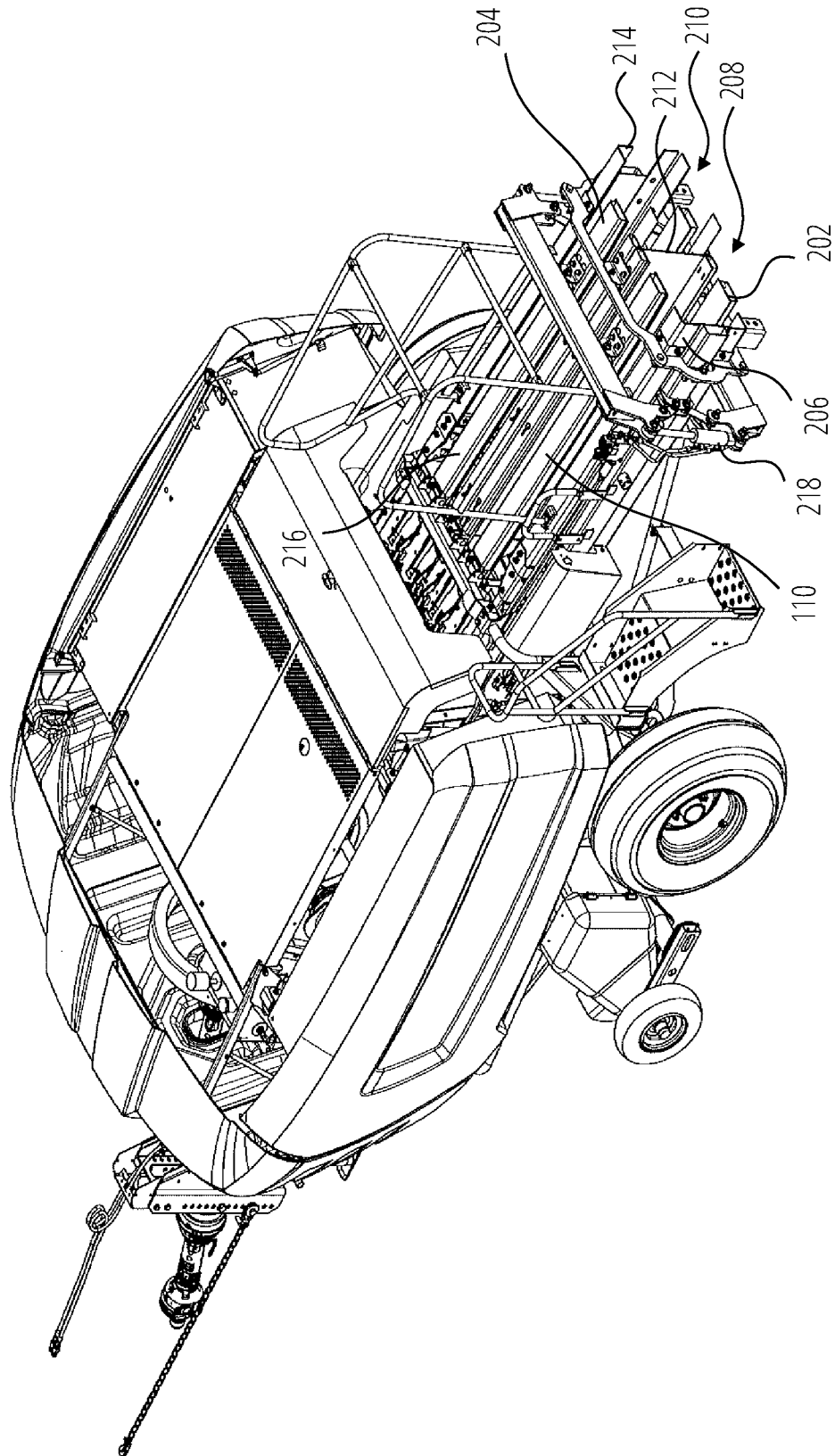


FIG. 2

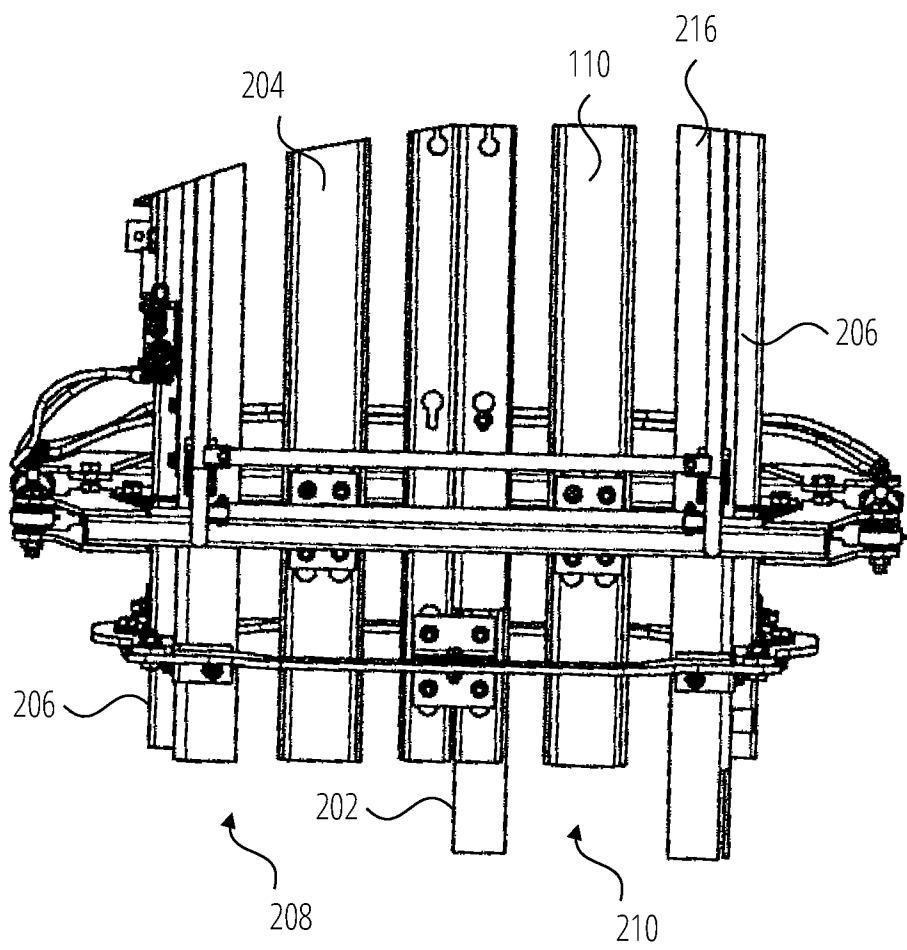


FIG. 3

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2024/054950

A. CLASSIFICATION OF SUBJECT MATTER

INV. A01F15/04 A01F15/08

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)

A01F

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**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2022/248608 A1 (GRADY MICHAEL JASON [US]) 11 August 2022 (2022-08-11) the whole document -----	1-5,7
A	CA 3 125 432 A1 (GREAT PLAINS MFG INC [US]) 16 July 2020 (2020-07-16) abstract; figures -----	1-5,7
A	US 3 099 203 A (KLEMM HERMAN G ET AL) 30 July 1963 (1963-07-30) cited in the application abstract; figures -----	1-5,7
A	US 10 869 428 B2 (GRADY MICHAEL JASON [US]) 22 December 2020 (2020-12-22) cited in the application abstract; figures -----	1-5,7

☐

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

2 August 2024

Date of mailing of the international search report

22/08/2024

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2

NL - 2280 HV Rijswijk

Tel. (+31-70) 340-2040,

Fax: (+31-70) 340-3016

Authorized officer

Vedoato, Luca

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2024/054950

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US	2022248608	A1	11-08-2022	NONE	

CA	3125432	A1	16-07-2020	AU 2020206761 A1	05-08-2021
			CA 3125432 A1		16-07-2020
			CA 3208973 A1		16-07-2020
			CA 3208975 A1		16-07-2020
			CA 3208977 A1		16-07-2020
			CA 3208980 A1		16-07-2020
			CA 3208985 A1		16-07-2020
			CA 3209000 A1		16-07-2020
			EP 3886563 A2		06-10-2021
			EP 4342282 A2		27-03-2024
			EP 4342283 A2		27-03-2024
			US 2020214213 A1		09-07-2020
			US 2020214214 A1		09-07-2020
			US 2020214216 A1		09-07-2020
			US 2020214217 A1		09-07-2020
			US 2020214220 A1		09-07-2020
			US 2020214221 A1		09-07-2020
			US 2020214222 A1		09-07-2020
			US 2020215918 A1		09-07-2020
			WO 2020146482 A2		16-07-2020

US	3099203	A	30-07-1963	GB 973740 A	28-10-1964
				US 3099203 A	30-07-1963

US	10869428	B2	22-12-2020	US 2020000041 A1	02-01-2020
				US 2021169011 A1	10-06-2021
				US 2024000020 A1	04-01-2024
				US 2024016096 A1	18-01-2024
