

(19) **DANMARK**

(10) **DK/EP 2944171 T3**



(12) **Oversættelse af
europæisk patentskrift**

Patent- og
Varemærkestyrelsen

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- (51) Int.Cl.: **A 01 B 69/00 (2006.01)** **A 01 B 79/00 (2006.01)**
- (45) Oversættelsen bekendtgjort den: **2019-04-23**
- (80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2019-01-30**
- (86) Europæisk ansøgning nr.: **15401040.9**
- (86) Europæisk indleveringsdag: **2015-05-05**
- (87) Den europæiske ansøgnings publiceringsdag: **2015-11-18**
- (30) Prioritet: **2014-05-14 DE 102014106775**
- (84) Designerede stater: **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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- (74) Fuldmægtig i Danmark: **Patrade A/S, Ceresbyen 75, 8000 Århus C, Danmark**
- (54) Benævnelse: **Landbrugsarbejdsmaskine**
- (56) Fremdragne publikationer:
EP-A1- 1 493 316
EP-A1- 1 529 428
EP-A1- 2 135 498
EP-A1- 2 622 955
DE-A1- 3 507 570
DE-A1-102006 055 858
JP-A- H04 104 712

Description

The invention relates to an agricultural working machine according to the preamble of Claim 1 and a method for controlling an implement of an agricultural working machine
5 according to the preamble of Claim 13.

Generic agricultural working machines are known from the prior art. Thus, for example, EP 2 679 085 A1 discloses an agricultural working machine comprising an implement, wherein a sensor unit, in particular an ultrasonic sensor unit, is arranged on
10 the implement, which performs the distance measurement in relation to the ground located below the implement and computes a working distance on the basis of the measured distance, according to which the implement, for example, a fertilizer sprayer, is operated. JP H04 104712 discloses an agricultural working machine comprising a sensor device which is arranged so that it can acquire 2D information on a piece of
15 ground lying in front of the working machine.

However, the known agricultural working machines and provided sensors only enable an adaptation of the working height or other operating parameters of the agricultural working machine to a very limited extent, since the time available between
20 measurement and required switching is very short.

It is therefore the object of the present invention to provide an agricultural working machine and a method for the operation thereof, which can react more effectively to changes in the surroundings of the implement.
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This object is achieved according to the invention by the agricultural working machine according to independent Claim 1 and the method for controlling an implement of an agricultural working machine according to Claim 13. The dependent claims contain advantageous refinements of the invention.
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The agricultural working machine according to the invention is characterized in that the sensor device is arranged in such a way that it can acquire the at least two-dimensional information on a piece of ground lying in front of the working machine.

Thus, already in a certain timeframe before the actual arrival of the agricultural working machine and the implement on the area of the field to be processed, two-dimensional information can be collected about this area and the control of the implement can be prepared and/or carried out with the aid of the control unit. The
5 implement can thus be adapted significantly more accurately to the conditions of the piece of ground lying in front of the working machine, whereby the productivity can be increased. The piece of ground lying in front of the working machine is to be understood in this context as not only the ground of the field, but rather also all
10 vegetation on the field. Not only the surface of the ground but also lower-lying ground layers are also included therein. The acquisition of 2D information relates to information on the piece of ground which is acquired in a plane which is perpendicular to the direction of travel of the vehicle. This plane can have a certain extension in the travel direction, which is determined, for example, via the field of vision of the sensor device. Although a three-dimensional detail of the piece of ground thus results, this is
15 to be summarized under the concept of the (essentially) two-dimensional information. The working machine according to the invention can be used as a field sprayer and is characterized in that the sensor device is an optical sensor or comprises an optical sensor, wherein the sensor device can measure crop height of crop located on the piece of ground lying in front of the working machine, and the control unit controls a
20 working height of the implement as a function of the crop height. In this way, the advantages of the agricultural working machine are applied to the determination of the working height of the implement as a function of the crop height. The control unit can calculate an optimum working height for the implement from all crop heights, determined at one time, of a specific area of the piece of ground. Since it can be
25 advantageous in the sense of economic processing of the field to not always operate at the maximum or minimum working height which would be possible on the basis of the information, an equilibrium between ideal processing and economic aspects can be found with the aid of the optimum working height in consideration of possible further operating parameters.

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In one embodiment, the sensor device is designed to acquire information on the piece of ground lying in front of the working machine continuously or at specific time intervals. A two-dimensional image of the entire surroundings can be prepared by

continuous measurement and a continuous control of the working machine can thus be achieved. However, if it is information to be acquired, for example, the height of the field at specific points, a measurement at significantly longer time intervals, for example, 3 or 5 seconds, can thus be sufficient to obtain rough information about the behavior of the piece of ground.

Furthermore, the sensor device can be designed to acquire information on the piece of ground lying in front of the working machine at least over an area corresponding to the working width of the implement. Since it is not the width of the actual tractor vehicle, but rather the working width which is relevant for an effective discharge of material or processing of a field, it can be ensured using this embodiment that an acquisition and accompanying analysis of information is carried out over the entire working width of the implement to optimize the result.

It can also be provided that the sensor device is arranged on the tractor vehicle and/or on the implement. The arrangement on the tractor vehicle enables an acquisition of the piece of ground lying in front of the working machine even before reaching the tractor vehicle, while in contrast an attachment of the sensor device on the implement does only enable only a shortened reaction time, but changes in the conditions of the piece of ground due to the tractor vehicle driving over it can be taken into consideration.

In one refinement, the working machine is characterized in that the sensor device can acquire 3D information on a piece of ground lying in front of the working machine. 3D information supplies an even more detailed foundation for a calculation and control of the implement. The acquisition of 3D information also comprises the above-described two-dimensional information on the piece of ground in any case.

Furthermore, the working machine can comprise a speed sensor which can measure a current speed of the working machine and can transmit to the control unit a signal which is indicative of the speed, wherein the control unit to control the at least one function of the implement on the basis of an extrapolation of the speed of the working machine and a time which is determined in this way when the implement is located over an area of the piece of ground which is measured by the sensor device. By linking

the information acquired on the piece of ground and movement information, it can be calculated beforehand in an advantageous manner here when a control of the implement is necessary and the optimum time for a change of the working height can be determined, for example.

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In one refinement of this embodiment, it is provided that the sensor device is a camera, and the control unit can determine a crop height from the image information in images recorded by the camera, or that the sensor device is a laser which can carry out a distance measurement with respect to crop which is located in front of the working machine, and the control unit can calculate a crop height from the distance measurement. While cameras only supply relatively rough information, which still has to be processed using image processing programs, the laser supplies significantly more accurate information. Both embodiments can advantageously be used depending on the required accuracy.

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The method according to the invention for controlling an implement of an agricultural working machine is characterized in that at least one function of the implement is controlled as a function of the 2D information on a piece of ground lying in front of the working machine. This predictive acquisition of information enables the most effective possible control of the implement. The method can be used to measure crop heights of crop located on the piece of ground lying in front of the working machine by means of an optical sensor and to set the working height of the implement as a function of the crop heights. The method according to the invention is advantageously applied here to the determination of the working height as a function of crop heights. Moreover, an optimum crop height can be determined from the crop heights, determined at a time, of a specific area of the piece of ground and the working height of the implement can be set in accordance with this optimum crop height. An equilibrium can thus be found between economic aspects and the determined crop heights.

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The method can include information on the piece of ground lying in front of the working machine being acquired continuously or at specific time intervals. An equilibrium can thus be achieved between the required quantity of information and the economical handling of collected data.

In one refinement, the time intervals are variable and are set as a function of the speed and/or acceleration of the working machine. If movement data of the agricultural working machine are taken into consideration to determine the intervals for information recording and/or acquisition, the same accuracy can always be ensured in the acquisition of the information.

Furthermore, information about the piece of ground lying in front of the working machine can be determined at least about the working height of the implement. This enables a consideration of all information relevant for the processing of the field.

In one embodiment, 3D information on a piece of ground lying in front of the working machine is acquired. The implement can be controlled more accurately by means of three-dimensional information.

It is advantageous if the function of the implement is controlled as a function of the information about the piece of ground at a time which is independent of the time at which the information about the piece of ground was recorded, and independent of the instantaneous speed of the working machine. An accurate control of the implement can thus be planned in a predictive manner.

In one refinement of this embodiment, the method is characterized in that crop heights are determined on the basis of image information, recorded by a camera, on the crop located in front of the working machine, or that a distance measurement with respect to the crop on a piece of ground located in front of the working machine is carried out by means of a laser, and a crop height is determined from the specific distance.

In one embodiment, the ground moisture is determined in a continuous and contactless manner by reflection.

Furthermore, an optimum seed depth can be determined from all ground moistures and ground contours of a specific area of the piece of ground measured at one time and the implement can be controlled as a function of the optimum seed depth. The most

optimum parameter setting can also be found here for the sowing as a function of the recorded information and economic aspects.

In the figures

5 Figure 1 shows a schematic view of an agricultural machine according to the invention.

Figure 2 shows a schematic top view of an agricultural machine according to the invention on a field.

10 Figures 3a-e shows a schematic illustration of the device according to the invention according to two embodiments and a method.

Figure 4a+b shows a schematic illustration of a further embodiment of the method.

Figure 1 shows an agricultural working machine 100 according to the invention in a schematic illustration on a field 110. The agricultural working machine 100 typically
15 comprises in this case a tractor vehicle 101 and an implement 102. In this case, tractor vehicle and implement do not necessarily have to be designed as two separate vehicles but rather can also be combined into one vehicle. Furthermore, the implement can be detachable from the tractor vehicle 101, so that different implements 102 can be used with the aid of the same tractor vehicle. All known machines from agricultural
20 technology come into consideration as implements, for example, field sprayers, fertilizer distributors, rotary harrows, seed drills, and so on.

According to the invention, the working machine 100 comprises a sensor device 103, which is attached to the agricultural working machine 100 so that it can acquire at least
25 two-dimensional information on a piece of ground lying in front of the working machine 100. This piece of ground can be, for example, the portion 104 of the field 110 to be processed which is located in front of the agricultural working machine. The sensor device 103 is preferably designed so that during the movement of the working machine 100 at the speed v over the field to be processed, it acquires at least two-
30 dimensional information about the field continuously or at specific time intervals, so that finally the corresponding information is available for the entire field.

In the illustrated embodiment, the sensor device 103 is formed from two separate

devices on the opposing ends of the implement 102 (a field sprayer here by way of example), wherein these devices are oriented in the travel direction so that they can acquire information on the piece of ground 104 lying in front of the implement 102.

5 This information can be, depending on the implement used, information relevant for the processing of the field, for example, the crop height of plants already grown on the field, the density of the crop, quality and properties of the ground, for example, ground
10 moisture or the like. For this purpose, the sensor device 103 can be designed in greatly varying ways. It can comprise a camera, for example, or a laser and a corresponding receiving unit for acquiring the reflected laser radiation from the crop or from the
ground. Furthermore, other sensors, such as microwave sensors, sound sensors, or the like can be used.

15 Since every implement possibly places different demands on the information to be acquired (type of information and accuracy, for example), it is advantageous if the sensor device 103 is arranged directly on the implement. The sensor device can thus be replaced directly upon replacement of the implement.

20 However, it can also be provided that the sensor device 103 is arranged on the tractor machine 101 to ensure an unrestricted field of vision. If the tractor machine 101 is used for different implements 102, it is particularly advantageous in this embodiment if the sensor device 103 is replaceable, so that a corresponding sensor device can be attached to the working machine 100 depending on the implement to acquire information
25 necessary for the function of the implement on the piece of ground lying in front of the working machine 100.

30 According to the invention, a control unit (not shown here) is provided in the working machine 100, for example, in the implement 102 itself or in the tractor machine 101, which can analyze the information acquired by the sensor device 103. This analysis can take place in greatly varying ways, but has as the result parameters which enable a control of the function of the implement. Thus, the control unit can compute, for example, from the crop height recorded by the sensor device 103, a working height for the implement 102, for example, a fertilizer spreader, and set the working height of the

implement 102 in accordance with the calculated working height in relation to the respective crop height.

Figure 2 shows a working machine 100 according to the invention as is also shown in
5 Figure 1, for example, on a field 200 in a top view. Implements 102 have at least a specific working width b , for example, 3 m, 5 m, 6 m, or 12 m. To control the functions of the implement 102 as effectively as possible over the entire working width, it is provided that the sensor device 103 acquires the two-dimensional information on the piece of ground 104 lying in front of the working machine 100 on
10 the field 200 at least on a width b which corresponds to the working width b of the implement 102. This means that, for example, a camera is to have a sufficiently large angle of vision that it can acquire a region having a width b , which corresponds to the working width of the implement, at a specific distance from the agricultural working machine 100 (for example, at 10 m distance or at 15 m distance) and can record the
15 corresponding information. Upon use of a laser sensor, the laser sensor is set so that it can also acquire information about the piece of ground 104 over the working width b . The function of the implement 102 as a whole or, if the implement 102 consists of individually operable components, the function of the individual components can be controlled as a function of the information thus acquired.

20 Since the information of the sensor device of the described control unit is already available before reaching the corresponding piece of ground, the control unit can operate the implement 102 in a timely manner to implement, for example, the working height or the seed depth in accordance with the previously recorded information as soon the implement 102 travels over the corresponding piece of ground 104.
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To further utilize this advantage, it can be provided that the working machine 100, as shown in Figures 1 and 2, comprises further movement or GPS sensors in addition to the sensor device 103, which can acquire position, speed, and preferably also
30 acceleration of the working machine. In consideration of these data and the recorded two-dimensional information about the piece of ground 104, the control unit can then additionally calculate or extrapolate when the implement 102 will presumably arrive on the piece of ground 104 and control the function of the implement accordingly.

Since the sensor devices collect information on the piece of ground continuously or at least permanently at time intervals, sufficient information is thus provided to the control unit to control the implement continuously during the entire operation over the piece of ground.

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Latency times can also be taken into consideration in this case. Thus, for example, a certain amount of time is required to change the working height of an implement. If the control unit establishes that an adaptation of the working height of the implement 102 is necessary at a specific point in time on the basis of the two-dimensional information on the piece of ground lying in front of the working machine, the control unit can thus, in consideration of the instantaneous speed of the working machine 100 but also in consideration of the adjustment of the working height from the starting height to the desired height, when the control signal has to be transmitted to the implement 102 to ensure that the provided working height is achieved at the provided position.

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Figure 3a shows a more specialized embodiment of the agricultural working machine according to the invention for this purpose, as is shown, for example, in Figure 1 and Figure 2. For the sake of simplicity, only the tractor vehicle 101 is partially shown for this purpose in Figure 3a. Figure 3a illustrates the acquisition of a crop height h of the crop located in front of the agricultural working machine on a field, i.e., the height of the plants grown on the field. In Figure 3a, the sensor device 103 is designed as a laser which sends a laser beam 304 at a predetermined angle in the direction of the field continuously or in short successive intervals. Either directly in the sensor device 103 or separately therefrom, a detector 305 can be provided which collects the reflected laser radiation. Either directly in the detector 305 and/or the sensor device 103 or in the control unit, the runtime difference can then be determined and the height and the distance of the crop can be determined therefrom. To enhance the accuracy of the acquired information, it can also be provided that the laser beam emitted by the sensor device 103 is pivotable, as indicated by the illustrated arrow direction. Information can thus be collected in a significantly larger area of the piece of ground lying in front of the working machine.

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Figure 3b shows another embodiment in which the sensor device 103 comprises a

camera, which films the piece of ground lying in front of the working machine in a specific angle of vision 308, for example, at a frame rate of 20 images per second or 40 images per second or more. The control unit can determine a crop height of the crop located in front of the working machine by means of known image processing
5 programs from the individual image information thus acquired. The distance determination is performed here at fixed time intervals on the basis of the frame rate, which is typically fixed in cameras.

It is to be noted that the acquisition of information can advantageously also be coupled
10 to the speed of the working machine, however. For example, to ensure an always constant acquisition of information with respect to the distance to be covered by the working machine, it can be provided that the frequency at which the information is acquired (or the time interval between two acquisition times) is set as a function of the speed of the working machine. If the working machine moves at a high speed, for
15 example, the acquisition of information should thus take place as frequently as possible per second to ensure that the information is as continuous as possible. However, if the working machine moves at significantly slower speed, an acquisition frequency which is not as high is thus sufficient, so that the time intervals between the individual acquisition times can be greater. It is thus possible to prevent an excessive amount of
20 redundant information from being acquired about the same area.

Regardless of whether the information is acquired continuously, as schematically shown in Figure 3c, or is acquired at specific time intervals, as shown in Figure 3d, the control unit or a corresponding associated microprocessor or computer determines a
25 specific property of the piece of ground lying in front of the working machine. The property selected here is the crop height h . For this purpose, every position x on the curve 350 shown in Figure 3c or the curve 351 shown in Figure 3d is associated with a crop height h . In Figure 3d this is not performed for every point x on the piece of ground but rather in accordance with the acquisition frequency of the information (for
30 example, 20 images per second if a camera is used). An information density or point density in the curve 351 thus also results therefrom as a function of the speed of the working machine which, if the acquisition frequency is not changed with the speed, can certainly vary. While a continuous curve for the crop height can be indicated with

continuous or nearly continuous information acquisition, as shown in Figure 3c, the information acquisition as specific time intervals, as shown in Figure 3d, thus possibly requires an interpolation between the individual points, however.

5 In one embodiment of the invention, however, it is provided that a control curve for the implement is derived by the control unit from the information of the sensor device 103 from the overall obtained information and in consideration of possible economic or technical aspects. In the control unit, this can comprise, for example, the working height of the working machine as a function of the crop height, that the control unit
10 determines an effective or optimum working for height for the implement from the recorded information, as shown in Figure 3e. This optimal working height can be regulated by the control unit in such a way, for example, that excessively large amplitudes in the setting of the working height of the implement are avoided and accordingly the extremes 355 shown in Figures 3c and 3d are only taken into
15 consideration by a slight reduction of the working height in Figure 3e in the area 361 here. It can thus be ensured on the one hand, for example, that the different properties of the piece of ground lying in front of the working machine with regard to the crop height, for example, are taken into consideration, but an equilibrium is maintained between the acquired data and other boundary conditions, for example, the technical
20 characteristics of the working machine.

A further embodiment for the determination of the optimum working height is shown in Figure 4. For this purpose, the information about the total working width b of the working machine or the implement is recorded by the sensor device, as was already
25 described with reference to Figure 2. For this purpose, as shown in Figure 4a, different heights h_1 via h_i to h_n are determined over the working width b . A minimum height and a maximum height can be determined therefrom over the entire area. The minimum heights 461 and the maximum heights 462 of the crop over the distance x are shown in Figure 4b. The optimum working height 463 can now be determined with the aid of the
30 control unit or a corresponding associated computer or microprocessor, which is between the minimum height and the maximum height of the crop in the normal case. A procedure can be used in this case in which averaging is performed over all heights h_1 to h_n at a specific point x and the corresponding mean value is established as the

working height. Weighting can also be performed here, however. This weighting can take into consideration, for example, how often specific heights which are significantly above the computed mean value or significantly below the computed mean value have been measured. These can be given less weight in the calculation of the optimum
5 working height, for example. Thus, crop heights which deviate by up to 20% from the mean value can thus be incorporated in the calculation, for example, with a weighting of 0.5. Heights deviating still further from the mean value could only be incorporated at 0.1 in the calculation. Extreme and therefore very rare deviations from the mean value are thus calculated out.

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Although the calculation was illustrated here as carried out over the entire working width b , it is also possible, of course, as described above, that an acquisition of two-dimensional information is considered separately for each segment by the control unit for implements which have separately operable segments. This means that although the
15 sensor unit acquires, for example, the entire quantity of information on the piece of ground lying in front of the working machine on the working width b , the control unit divides the collected information in accordance with the segments of the implement and, for example, operates the functions of the individual segments of implement separately similarly to the above-described method.

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In Figures 3 and 4, reference was made in particular to the crop height, which is measured by the sensor device and processed by the control unit to calculate an optimum working height for the implement. However, as described above, in principle all acquired information can be used to control any type of functions of the implement
25 of the agricultural working machine as a function of this information.

The described agricultural working machine and also the method according to the invention are applicable not only to the use of, for example, field sprayers (change of the working height) or seed drills (change of the seed depth), but rather can
30 advantageously be used in principle in all agricultural working machines, if the functionality of the implement is dependent on the external conditions of the piece of ground or the crop. It is also to be noted here that it is not only possible with the aid of the provided sensor device, of course, to acquire two-dimensional information (crop

height over the working width), but rather three-dimensional information can also be acquired, as shown, for example, in Figure 4a.

PATENTKRAV

1. Landbrugsarbejdsmaskine (100) omfattende et traktorkøretøj (101), et redskab (102), en sensoranordning (103) til erhvervelse af mindst 2D-information og en styreenhed, der er forbundet til sensoranordningen (103) og redskabet (102) og er egnet til styring af mindst en funktion af redskabet (102) i afhængighed af informationen erhvervet af sensoranordningen (103), hvor sensoranordningen (103) er indrettet på en sådan måde, at den kan erhverve 2D-information på et jordstykke (104) liggende foran arbejdsmaskinen (100), **kendetegnet ved**, at sensoranordningen (103) er en optisk sensor eller omfatter en optisk sensor, hvor sensoranordningen kan måle afgrødehøjde (h) af afgrøde, beliggende på jordstykket, liggende foran arbejdsmaskinen, og styreenheden styrer en arbejdshøjde på redskabet (102) som en funktion af afgrødehøjden (h), og at styreenheden kan beregne en optimal arbejdshøjde (463) for redskabet fra alle afgrødehøjder (h_1 , h_i , h_n) bestemt på et tidspunkt på et specifikt område på jordstykket, hvor erhvervelsen af 2D-information vedrører information på jordstykket, som er erhvervet i et plan, der er vinkelret på køretøjets kørselsretning.
2. Arbejdsmaskine ifølge krav 1, **kendetegnet ved**, at sensoranordningen (103) er udformet til at erhverve information på jordstykket (104) liggende foran arbejdsmaskinen (100), kontinuerligt eller med specifikke tidsintervaller.
3. Arbejdsmaskine ifølge krav 1 eller 2, **kendetegnet ved**, at sensoranordningen (103) er udformet til at erhverve information på jordstykket (104), liggende foran arbejdsmaskinen (100), i det mindste over et område af redskabets (102) arbejdsbredde (b).
4. Arbejdsmaskine ifølge et af kravene 1 til 3, **kendetegnet ved**, at sensoranordningen (103) er anbragt på traktorkøretøjet (101) og / eller på redskabet (102).
5. Arbejdsmaskine ifølge et af kravene 1 til 4, **kendetegnet ved**, at sensoranordningen (103) kan erhverve 3D-information på et jordstykke (104) liggende foran arbejdsmaskinen (100).
6. Arbejdsmaskine ifølge et af kravene 1 til 5, **kendetegnet ved**, at arbejdsmaskinen omfatter en hastighedssensor, som kan måle en arbejdsmaskines aktuelle hastighed og

kan sende et signal til styreenheden, som indikerer hastigheden, hvor styreenheden til kontrol af den i det mindste ene funktion af redskabet (102) på basis af en ekstrapolation af arbejdsmaskinens hastighed og en tid, der bestemmes på denne måde, når redskabet er placeret over et område på jordstykket (104) som måles af sensoranordningen (103).

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7. Arbejdsmaskine ifølge krav 1, **kendetegnet ved**, at sensoranordningen (103) er et kamera, og styreenheden kan bestemme en afgrødehøjde (h) fra billedinformationen i billeder optaget af kameraet, eller at sensoranordningen (103) er en laser, der kan udføre en afstandsmåling med hensyn til afgrøde, som er beliggende foran arbejdsmaskinen (103), og styreenheden kan beregne en afgrødehøjde (h) fra afstandsmålingen.

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8. Fremgangsmåde til styring af en landbrugsarbejdsmaskines (100) redskab, hvor 2D-information på et jordstykke (104) liggende foran arbejdsmaskinen (100) samles, og i det mindste en funktion af redskabet (102) styres som en funktion af 2D-informationen, **kendetegnet ved**, at afgrødehøjder (h) af afgrøde beliggende på jordstykket (104) liggende foran arbejdsmaskinen måles ved hjælp af en optisk sensor og redskabets (102) arbejdshøjde er indstillet som en funktion af afgrødehøjderne (h), og i at en optimal arbejdshøjde (463) bestemmes ud fra afgrødehøjderne (h₁, h_i, h_n) bestemt på et tidspunkt på et specifikt område på jordstykket (104) og redskabets arbejdshøjde (102) er indstillet i overensstemmelse med denne optimale arbejdshøjde (463), hvor erhvervelsen af 2D-information vedrører information på jordstykket, der samles i et plan, der er vinkelret på køretøjets kørselsretning.

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9. Fremgangsmåde ifølge krav 8, **kendetegnet ved**, at information på jordstykket (104), liggende foran arbejdsmaskinen (100), erhverves kontinuerligt eller med specifikke tidsintervaller.

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10. Fremgangsmåde ifølge krav 9, **kendetegnet ved**, at tidsintervallerne er variable og indstilles som en funktion af arbejdsmaskinens (100) hastighed og / eller acceleration.

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11. Fremgangsmåde ifølge et af kravene 8 til 10, **kendetegnet ved**, at information om jordstykket (104), liggende foran arbejdsmaskinen (100), i det mindste bestemmes omkring redskabets arbejdshøjde (b).

12. Fremgangsmåde ifølge et af kravene 8 til 11, **kendetegnet ved**, at 3D-information på et jordstykke (104) liggende foran arbejdsmaskinen (100) erhverves.

5 13. Fremgangsmåde ifølge et af kravene 8 til 12, **kendetegnet ved**, at redskabets (102) funktion styres som en funktion af informationen om jordstykket (104) på et tidspunkt, der er uafhængigt af tidspunktet hvor informationen om jordstykket (104) blev registreret og uafhængigt af arbejdsmaskinens øjeblikkelige hastighed (100).

10 14. Fremgangsmåde ifølge krav 8, **kendetegnet ved**, at afgrødehøjder (h) bestemmes på baggrund af billedinformation registreret af et kamera af afgrøden beliggende foran arbejdsmaskinen (100), eller i en afstandsmåling med hensyn til afgrøden på et jordstykke placeret foran arbejdsmaskinen udføres ved hjælp af en laser, og en afgrødehøjde bestemmes ud fra den specifikke afstand.

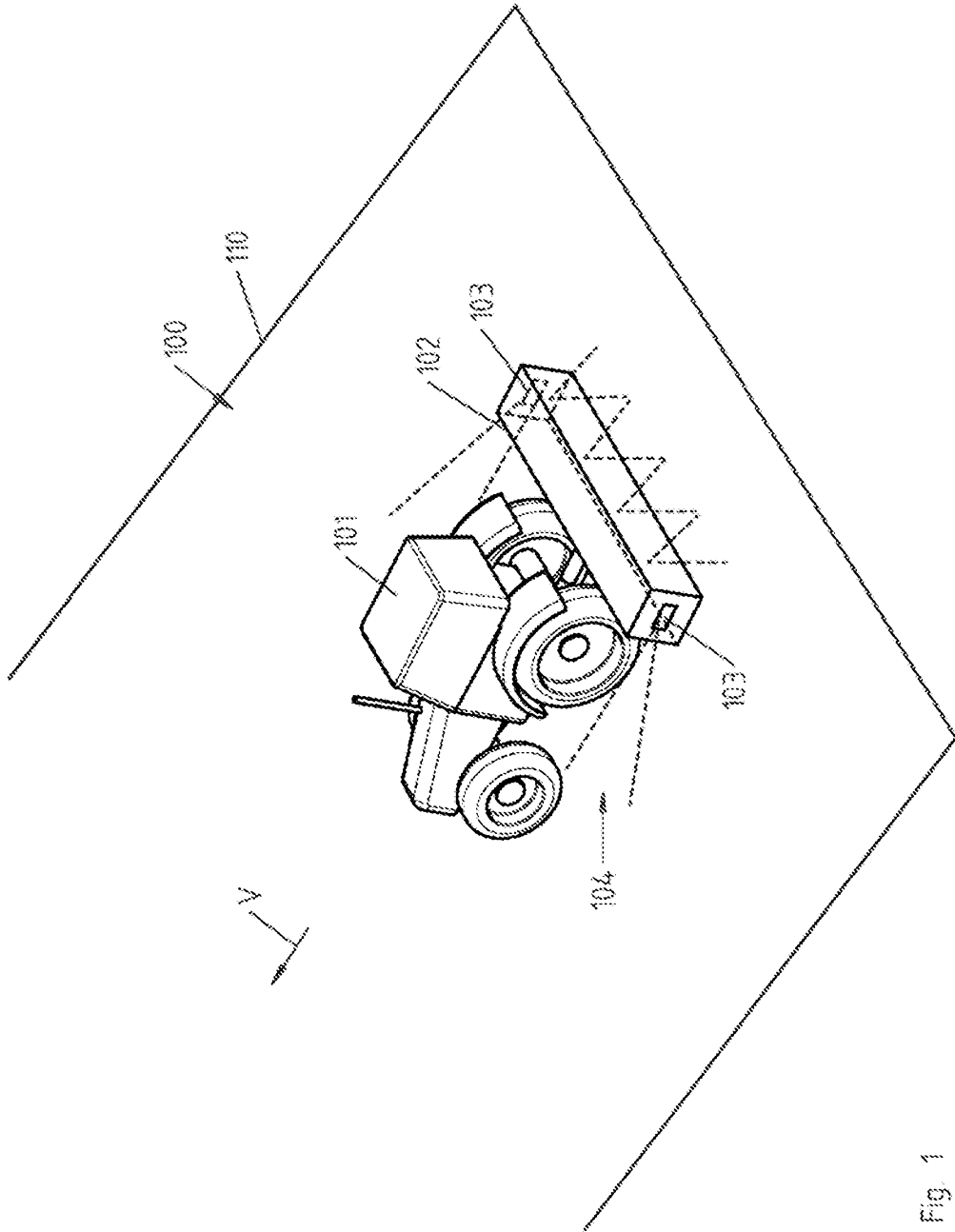


Fig. 1

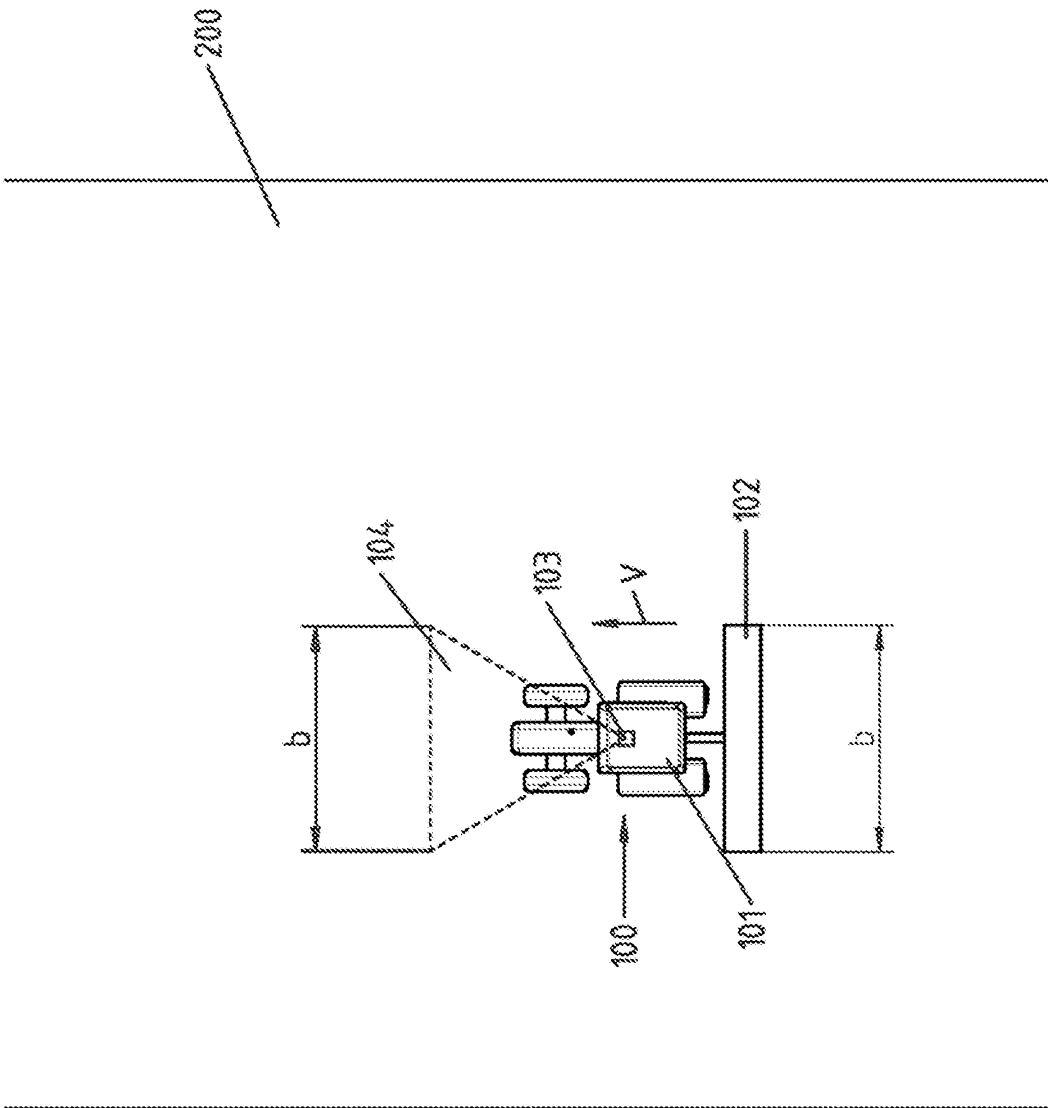


Fig. 2

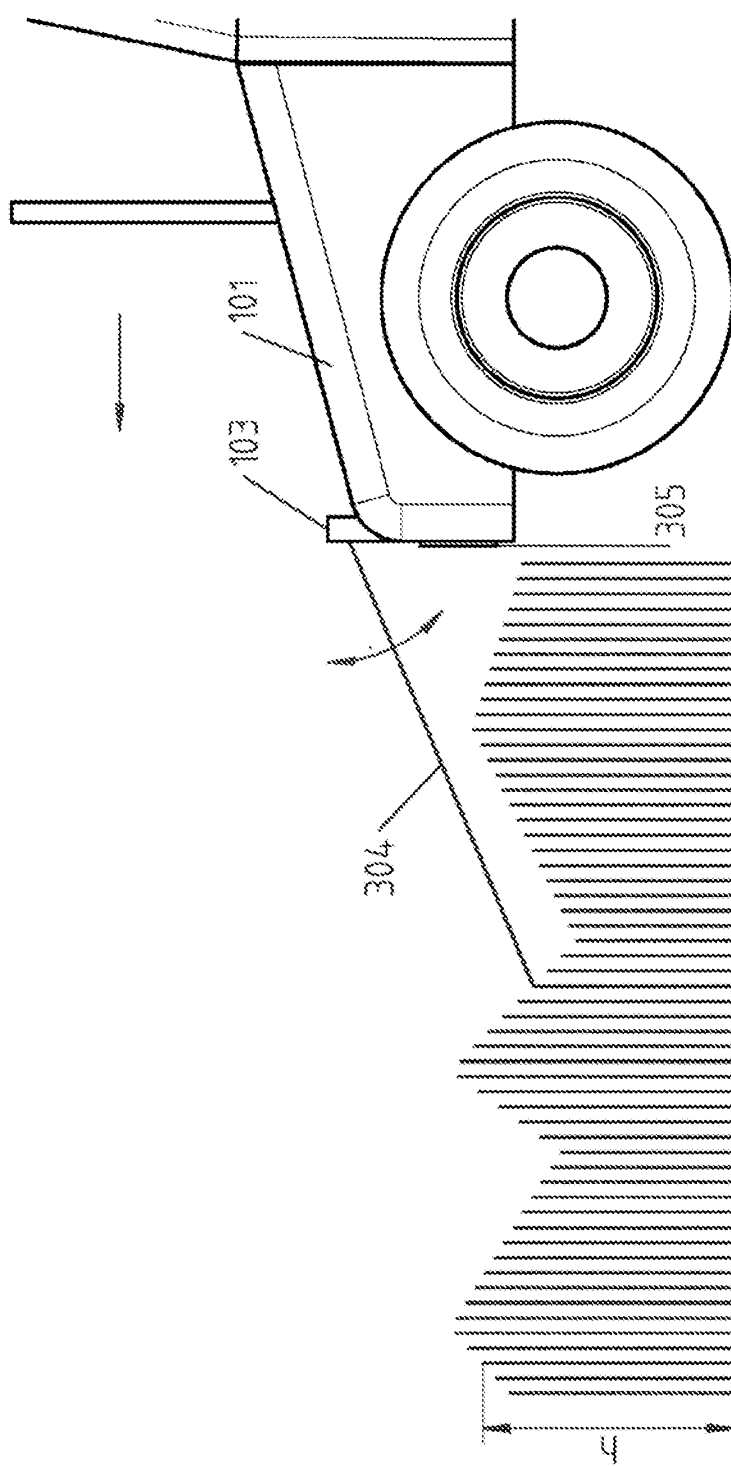


Fig. 3a

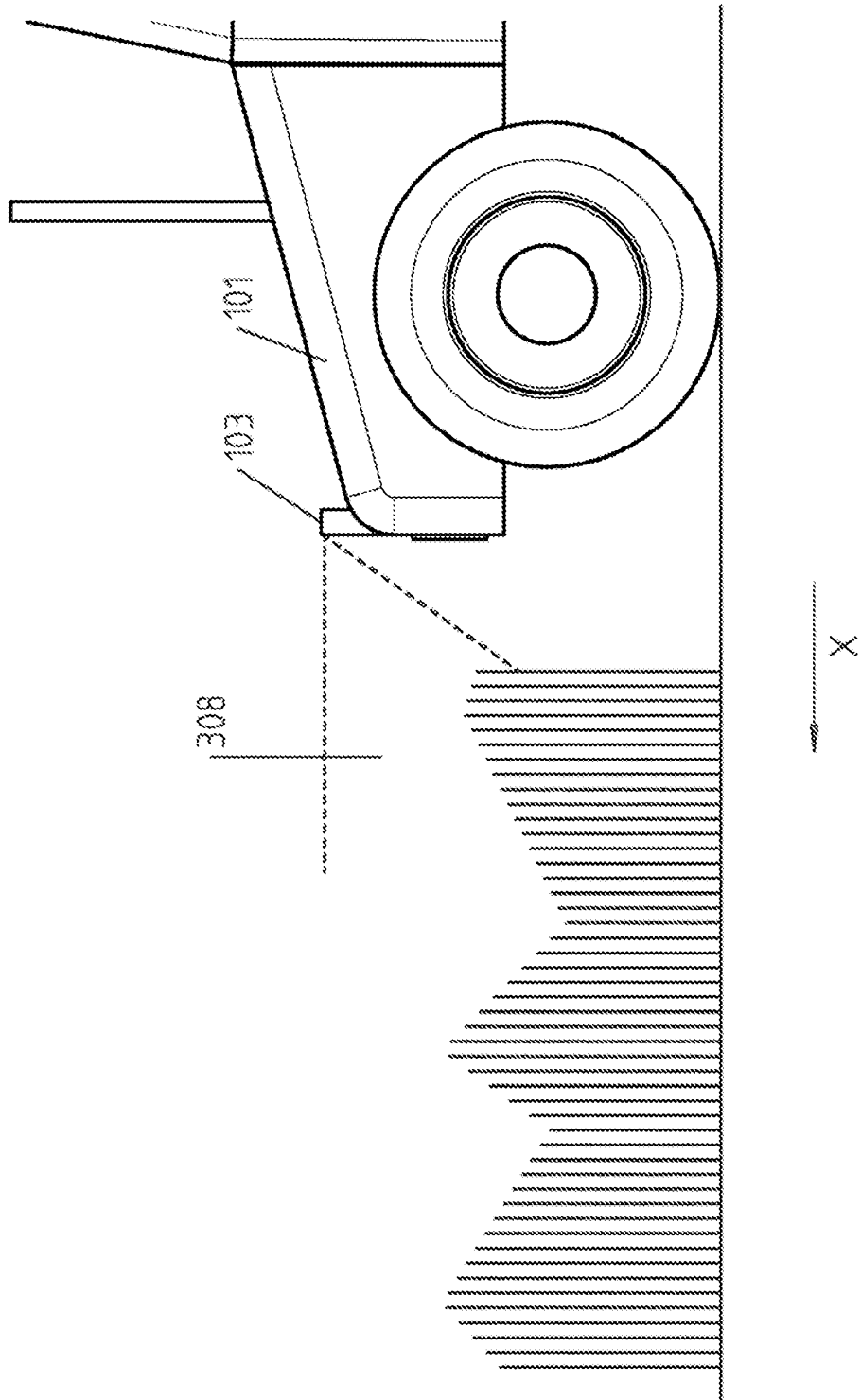


Fig. 3b

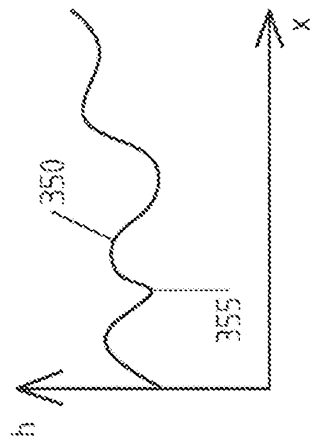


Fig. 3c

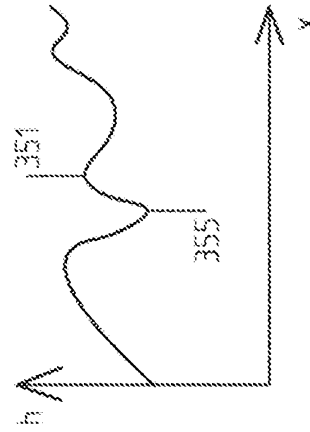


Fig. 3d

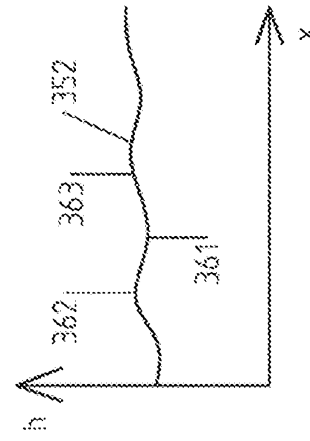


Fig. 3e

