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Agricultural machine

Machine agricole

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(73) Proprietor: **Amazonen-Werke**
H. Dreyer GmbH & Co. KG
49205 Hasbergen (DE)

(72) Inventor: **Pokriefke, Michael**
27798, Hude (DE)

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Description

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

[0002] Such an agricultural machine is known, for example, from DE 10 2006 034 798 A1. This agricultural machine is designed as a seed drill. In this case, the machine frame can be adjusted about a pivot axle extending transversely to the direction of travel by means of a motor-driven actuating device in order to achieve an adaptation of the seed coulters to the ground contour, in order to ensure a uniform working depth or placement depth of the seed to be sown. The arrangement and design of the machine frame for adapting the seed coulters is relatively complex.

[0003] The invention is based on the object of being able to achieve a uniform working depth of soil cultivating tools and/or placement depth of the seed to be deposited by soil cultivating elements and/or seed coulters in a simple manner.

[0004] According to the invention, this object is achieved by the characterizing features of patent claim 1. As a result of these measures, the position of the soil cultivating elements relative to the machine frame is scanned in a simple manner and the machine frame is adjusted to such an extent that the soil cultivating elements in the first cross-row are in the same position relative to the machine frame as the soil cultivating elements in the rear cross-row. This means that it is surprisingly easy to achieve a uniform working depth on uneven and changing ground surfaces simply by adjusting the machine frame on which the soil cultivating elements are arranged.

[0005] This makes it easy to align the supporting frame parallel to the ground by sensing the ground parallelism by determining the angular position or position of the soil cultivating elements. This makes it surprisingly easy to achieve the working depth when crossing depressions and hilltops. The angular position between the soil cultivating element of the front and rear cross-rows can be easily adjusted.

[0006] In order to be able to use the agricultural machine as a seed drill in a simple manner, it is provided that the sowing unit, designed as a work unit, comprises at least one seeding coulter with depth control rollers and/or pressure rollers.

[0007] Further details of the invention can be found in the example description and the drawings. These show

Fig. 1 an agricultural machine in side view and principle view when crossing a hilltop without adjusting the machine frame in relation to the support frame,

Fig. 2 an enlarged scale of the machine frame with seed coulters and depth control rollers arranged on the support frame according to Fig. 1,

Fig. 3 an agricultural machine in side view and a schematic diagram of the machine crossing a hilltop with the machine frame adjusted in relation to the supporting frame,

Fig. 4 an enlarged view of the machine frame arranged on the carrying frame with seed coulters and depth control rollers according to Fig. 3,

Fig. 5 the agricultural machine in side view and principle representation when crossing a depression with adjustment of the machine frame in relation to the supporting frame and

Fig. 6 an enlarged scale of the machine frame arranged on the supporting frame with seed coulters and depth control rollers according to Fig. 5.

[0008] The agricultural machine is designed as a semi-mounted seed drill. The seed drill has a machine frame 1 supported on the ground by a running gear 2. The machine frame 1 has a pulling device 3 on its front side, which is coupled to the coupling devices 4 of the tractor 5 pulling the agricultural machine.

[0009] A supporting frame 6 is arranged on the rear of the machine frame 1. A work unit 7 is arranged on this supporting frame 6. The work unit 7 comprises soil cultivating elements designed as seed coulters 8 with associated depth control rollers and/or pressure rollers 9. In the embodiment example, the soil cultivating elements designed as seed coulters 8 are arranged in three cross-rows at a distance from one another one behind the other. The soil cultivating elements 8 with the associated depth control rollers 9 are each arranged on the spaced-apart cross beams 12 of the support frame 6 so that they can be moved in the vertical direction by means of a retaining arm 10 with an articulated connection 11. The soil cultivating elements 8 are pressed against the ground 13 by spring

elements, not shown, arranged between the retaining arms 10 of the soil cultivating elements 8 and the cross beams 12. These spring elements can, for example, be designed as known rubber suspensions. In this case, the spring force is applied by turning the cross beams 12, which are arranged rotatably on the supporting frame 6, by means of the actuating means in the form of hydraulic cylinders 14 through the rubber elements.

[0010] The supporting frame 6 is attached to the machine frame 1 by means of an articulated coupling 15. This articulated coupling 15 has a pivot axle 17 running transversely to the direction of travel 16. Furthermore, at least one motor-driven actuating device in the form of a hydraulic cylinder 18 is arranged between the supporting frame 6 and the machine frame 1. By means of this hydraulic cylinder 18, the supporting frame 6 with the soil cultivating elements 8 and associated rollers 9 arranged thereon can be pivoted about the pivot axle 18 running transversely to the direction of travel 16.

[0011] As Figs. 1 and 2 show, when driving over a ground knoll 19, it is no longer ensured that all seed coulters 8 penetrate into the ground 13 or penetrate evenly deep into the ground 13 in order to cultivate the ground 13 or deposit the seed to be sown, as Figs. 1 and 2 show. In the situation shown, the machine frame 1 or the line drawn through the supporting beams 12 is no longer parallel to the ground surface 13 to be cultivated. Due to the spring arrangement, the seed coulters 8 are pressed downwards, but as the supporting frame 6 is not parallel to the ground surface, it cannot adapt to the shape of the ground surface 13.

[0012] To remedy this, the supporting frame 6 must be pivoted around the pivot axle 17 running through the articulated coupling 15 by means of the hydraulic cylinder 18, as shown in Figs. 3 and 4. After pivoting, the supporting frame 6 is parallel to the ground surface 13 to be cultivated, so that all seed coulters 8 penetrate the ground 13 to the same depth and the rollers 9 are pressed against the ground 13 by means of the spring force.

[0013] To achieve this automatically, a sensor element 20 for detecting the deflection of the retaining arm 10 of the soil cultivating element 8 relative to the supporting frame 6 is assigned to each soil cultivating element 8 of the front cross-row and the rear cross-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 the on-board computer 21, by means of which the control elements of the motor-driven actuating device 18 are controlled by the on-board computer 21 in such a way that, by pivoting the supporting frame

6 by the actuating device 18, the deflection of the soil cultivating elements 8 of the first cross-row is at least approximately equal to the deflection of the soil cultivating elements 8 of the rear cross-row relative to the supporting frame 6, as shown in Figs. 3 and 4. By means of this evaluation program of the on-board computer 21 and the detection of the position of the retaining arms 10 of the soil cultivating elements 8 in relation to the supporting frame 6, the position of the supporting frame 6 in relation to the soil cultivating elements 8 and thus to the contour of the ground surface 13 can be adjusted during the entire cultivation process and the deflection of the soil cultivating elements 8 of the rear cross-row in relation to the supporting frame 6 and the deflection of the soil cultivating elements 8 in relation to the first outer row can be adjusted and maintained at least approximately the same. In this way, a uniform penetration depth of the soil cultivating elements 8 or the seed coulters into the ground 13 is achieved. By simply comparing the angle values between the soil cultivating elements 8 of the first cross-row and the soil cultivating elements 8 of the rear cross-row relative to the supporting frame 6, an adaptation to the ground level or contour can be achieved in a simple manner by adjusting the supporting frame 6.

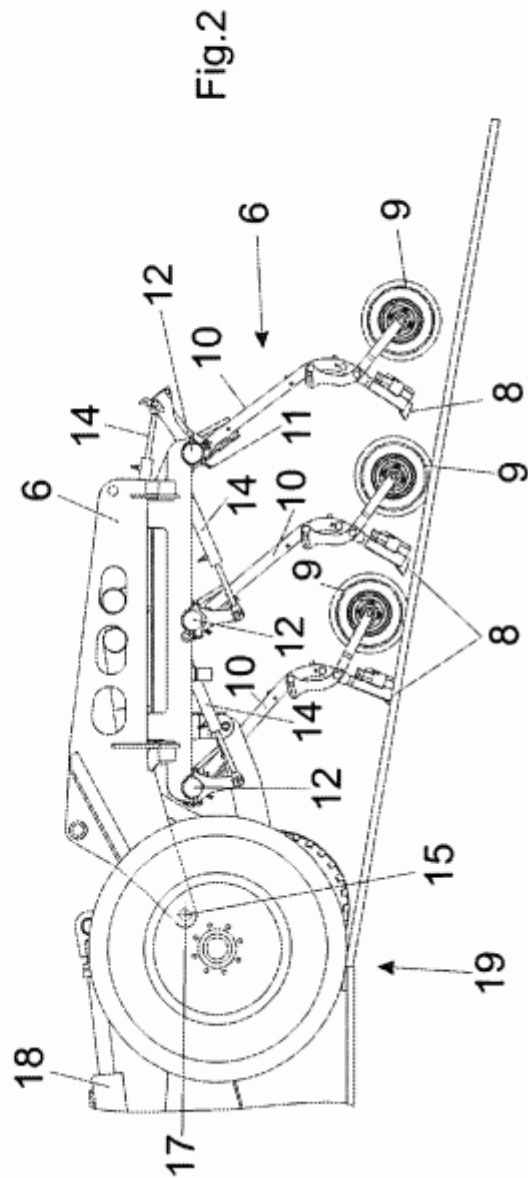
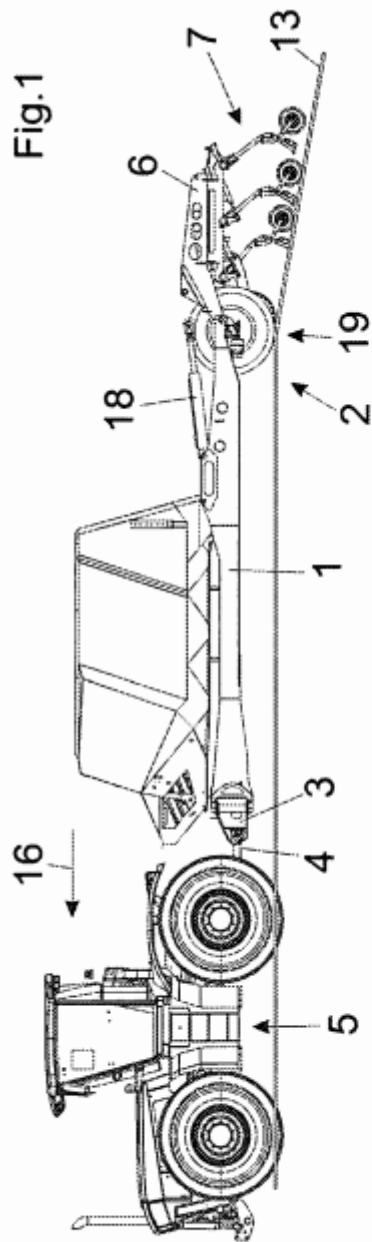
[0014] Figs. 4 and 5 show the situation when the agricultural machine passes through a depression 22. Here, too, the supporting frame 6 is pivoted via the hydraulic cylinder 18 based on the signals evaluated by the on-board computer 21, so that the supporting frame 6 is pivoted in the opposite direction to the setting shown in Figs. 3 and 4.

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 are arranged so as to be movable in the vertical directions 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).



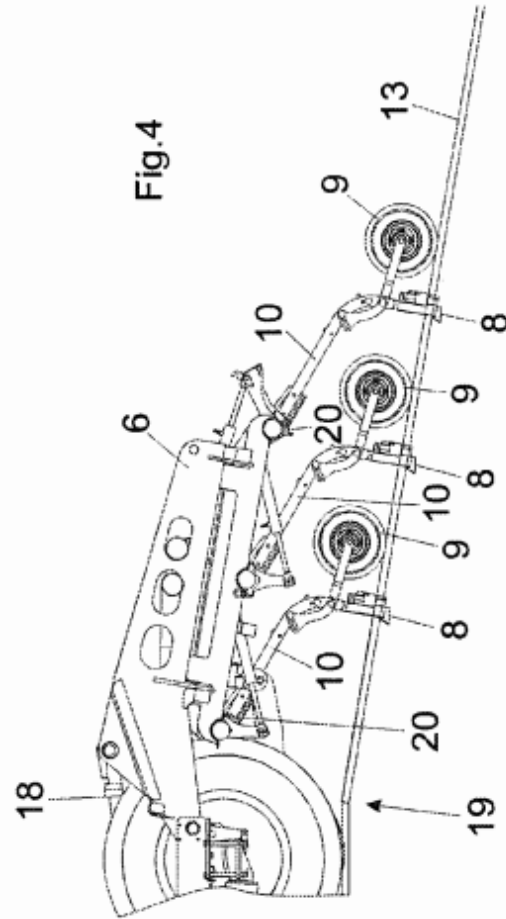
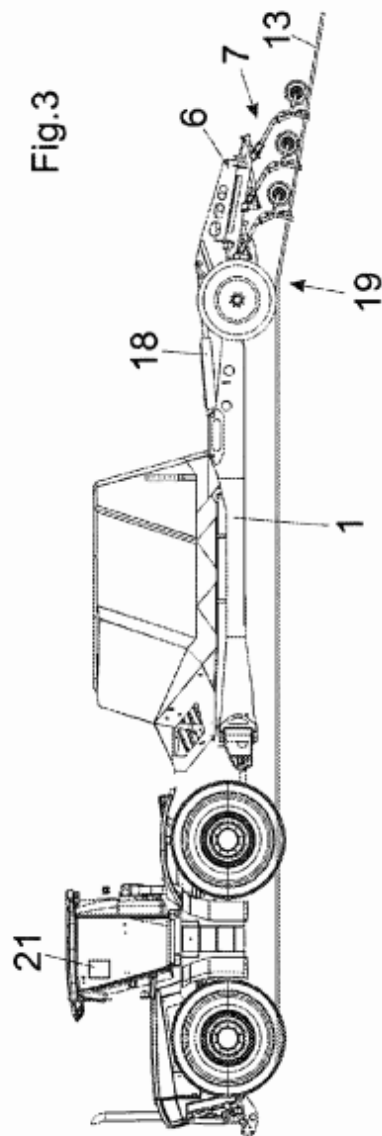


Fig.5

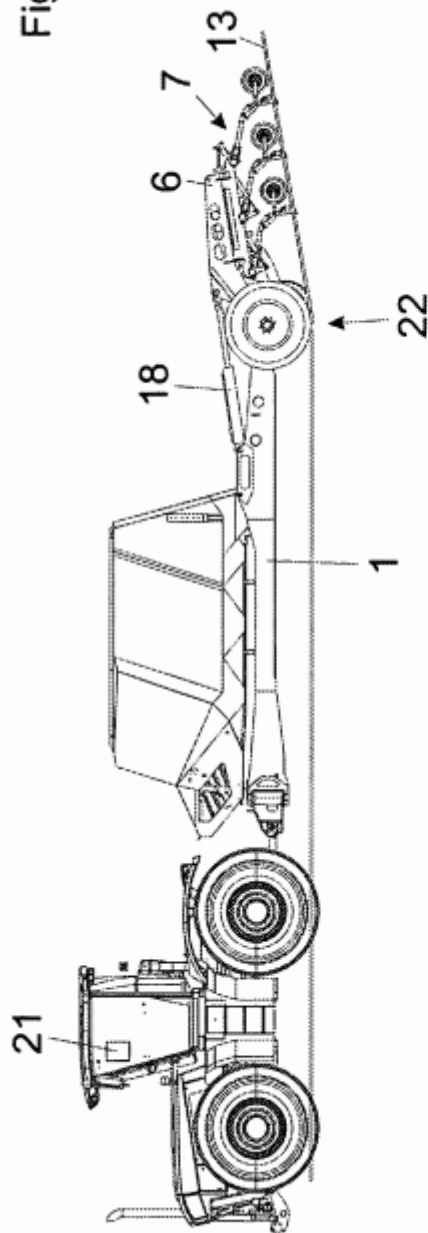
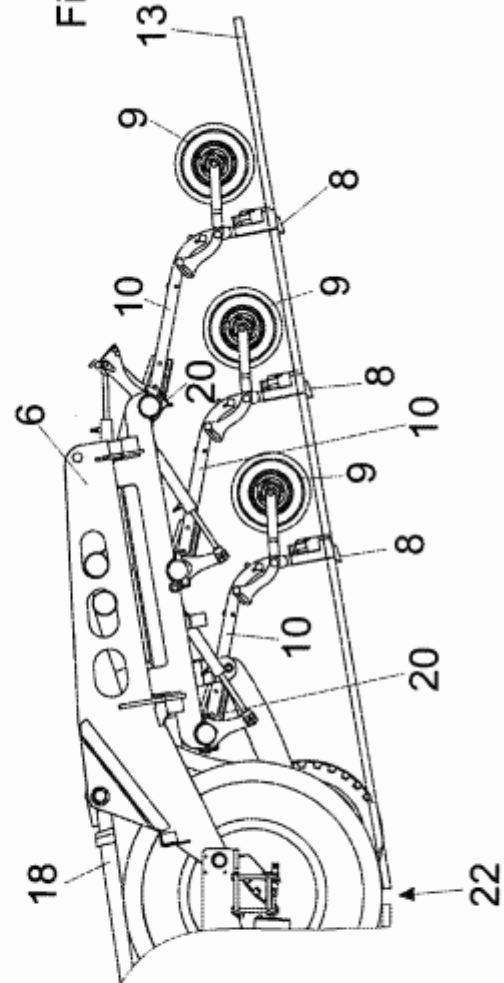


Fig.6



REFERENCES CITED IN THE DESCRIPTION

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