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AGRICULTURAL WORKING DEVICE IN FORM OF A FLAIL MOWER

DESCRIPTION

The invention relates to an agricultural working apparatus in the form of a mulching apparatus with a working rotor with flails.

Agricultural working apparatuses of this kind for processing biomass - in particular, plant parts for separating and comminuting soil growth, such as grass, but also plant stubble - as separation and comminution apparatuses - in particular, as mulching apparatuses, mulch-mowing apparatuses, or rototillers - are widely used, *inter alia*, in the cultivation of fallow fields and landscapes, and in agriculture. They are used there for mowing and comminuting plant vegetation, plant residues, and biomass of various types, such as grass, cover crops, cereal plant stubble, oilseed rape, corn, branches, or bushes. This is separated from the ground by the working apparatuses, taken up, comminuted by a working rotor of the working apparatus, and returned to the ground. The divided and distributed plant material on the ground rapidly decays on the ground due to its condition. This also serves as a fertilizer for the soil, for the formation of humus, and for field hygiene measures.

In addition to the working rotor, such working apparatuses comprise a cutting device having at least one cutting rail, which is arranged at a distance from the working rotor within the housing of the working apparatus. The distance between the cutting rail and the working rotor forms a gap, which primarily determines the size and condition of the comminuted plant material. In most working apparatuses from the prior art, the cutting rail together with the cutting device is arranged locally fixed within the housing of the working apparatus. An adjustment to different cutting lengths, and distances from the working rotor, is therefore not possible.

Individual working apparatuses of the type mentioned are known, in which the cutting device or the cutting rail can be manually adjusted by the user. For this purpose, fastening elements are first released, which elements hold the cutting device on the housing of the working apparatus. Subsequently, the cutting

device or the cutting rail is offset and again attached to the housing of the apparatus by means of the fastening elements. This process is very laborious under frequently changing circumstances, e.g., in the case of changes in the plants or biomass, or the amount, density, moisture content, soil conditions, or in the case of changes in weather, and does not allow a dynamic adjustment of the cutting device during operation of the apparatus. In addition, the space in the interior of the housing is limited in such a way that individual components arranged in the working path of the ground cover to be comminuted significantly interfere with the workflow.

GB 561 474 A describes a spindle mower having a cutting device with a cutting blade and a rotatable cutting device, wherein it is necessary for the rotatable cutting device to be in contact with the cutting blade in order to achieve the cutting effect. In the case of continuous use of the spindle mower, the cutting blade is used in such a way that a gap is formed between the cutting blade and the cutting device, and an effective cutting effect is absent. The distance between the rotatable cutting device and the cutting blade can be set by an eccentric part, in that the eccentric part is articulated by means of holding apparatuses arranged on the cutting blade, to the side thereof, and two transverse shafts. The cutting blade is adjusted by means of manual actuation of a bolt, and is laborious.

WO 82/01299 A1 discloses a further spindle mower with a cutting wheel having blades which interact with a transversely-extending cutting edge. Furthermore, an adjustment system having actuating means is provided, in order to move the cutting edge in the direction of the cutting wheel.

The adjustment takes place via a pivoting movement of the shear bar about a pivot axis parallel to the axis of rotation of the cutting wheel.

Another spindle mower of the same design is known from US 5 477 666 A. Here, the pivoting movement takes place by means of a hydraulically or pneumatically operated reciprocating piston.

EP 2 425 705 A1 relates to a cutting device for an agricultural harvesting machine designed as a forage harvester, having a rotatable cutting tool

and a shear bar which is adjustable with respect to said cutting tool. The shear bar has a counter-cutting bar and a counter-cutter support. In order to adjust the shear bar, adjusting devices which engage laterally at both ends of the counter-cutter support are provided in the transverse direction, said adjusting devices engaging on the counter-cutter support via one lever arm in each case, and comprising the motors each having a spindle. The adjustment of both sides of the counter cutter always takes place mutually independently.

The object of the invention is to eliminate the mentioned disadvantages and to further develop the working apparatus mentioned at the outset, in such a way that adjustability - in particular, continuous - of the cutting device, in the working process, which can be controlled by a user and has a small space requirement, is made possible.

The object is achieved by an agricultural working apparatus having the features of claim 1.

As a result of the embodiment according to the invention of a generic apparatus, it is achieved in particular that, in addition to the previous function of separating, picking up, conveying, handling, processing, comminuting, and defibering a stationary biomass still connected to the root, i.e., plants, this can also advantageously be used for the corresponding aforementioned processing of biomass already separated on the soil surface, i.e., plant parts and plant residues, such as vegetation, plants, plant residues, plant stubble, growth, grass, bushes, branches, and biomass of all types.

The invention is based upon the consideration that, in the central region of the apparatus, components thereof are present for connection to a pulling/carrying guide. As a result of the arrangement of the connecting piece on a transverse side of the apparatus, the connection components do not have to be changed, and therefore, at the same time, a defined engagement point for the adjustment of the cutting device is created. In this case, the connecting piece can be arranged on the upper and/or lower side of the cutting edge and/or on the side surfaces, facing the respective transverse sides, of the cutting rail.

In the context of the invention, the transverse direction denotes that direction which, in the horizontal direction, is perpendicular to the direction of travel of the working apparatus. The height direction is perpendicular to both the direction of travel and the transverse direction.

The cutting device of the apparatus according to the invention can have at least one - in particular, planar - holder, which is connected to the cutting rail. A basic effect of the invention is the adjustability of the cutting rail. A holder renders it unnecessary to have to drive the cutting rail directly. The cutting rail is held by a holder. The mechanical stability of the cutting rail is thus increased. Preferably, several holders can be provided, relative to which the cutting rail is movable, in order to reduce the mechanical load on the cutting rail per spatial unit as a result of the adjustment. In particular, due to the holder, the cutting rail is fixed, relative to the housing of the apparatus, in the vertical direction and transverse direction.

In an advantageous embodiment, the connecting piece has a bolt which is fixed on the cutting rail and which engages in a depression, and in particular in a recess, of the adjusting device. The bolt provides a simple connection option to a drive for the cutting rail, which ensures the transmission of the forces necessary for the adjustment of the cutting rail.

In order to minimize wear effects and to enable gentle actuation of the cutting device, in the depression, a sliding block can be arranged between the bolt and the adjusting device. Within the meaning of the invention, the sliding block is characterized in particular in that the bolt is movable, in as low-friction a manner as possible, in the depression of the adjusting device. In this case, the footprint of the sliding block can be designed as a function of the geometric shape of the depression, and in particular can be polygonal/angular or round.

In an advantageous embodiment, a spring element is arranged between the bolt and the sliding block, said spring element in particular being a resilient enclosure thereof that surrounds the sliding block. For this purpose, the spring element has a resilient material, so that part of the force transmitted by the adjusting device to the bolt is converted into a restorable deformation of the spring element. This prevents tilting of the cutting rail.

Instead of or in addition to the design of the bolt, the connecting piece can have at least one adapter plate which is connected to the adjusting device. The adapter plate can be arranged having its surface in particular perpendicular to the surface of the cutting rail, and, in this embodiment, in particular creates a larger connection surface to the adjusting device. In this case, the adapter plate can be connected to the adjusting device by means of screws, bolts, and/or rivets. The connection between the adapter plate and the adjusting device can be designed to be detachable in order to carry out particularly simple maintenance work or adjustments manually.

The adjusting device has an actuating cylinder which can be connected with the piston, by means of the adapter plate, to the cutting device and to the adjusting device.

The piston is guided in a linearly-movable manner within the actuating cylinder. This embodiment provides an effective possibility for converting a drive movement into a linear movement for adjusting the cutting rail. The actuating cylinder can have, on its lateral surface, an in particular cylindrical cam which can be brought into engagement with the adjusting device in a form-fitting manner. As a result, the connecting piece is connected to the adjusting device in a particularly stable manner. Actuating cylinders are preferably hydraulic cylinders, i.e., ones working with hydraulic oil as working means. Pneumatically-operated actuating cylinders can also be used.

In a particularly preferred embodiment, the adjusting device has a pivotable rocker. By utilizing a pivoting movement for driving the cutting device, lever effects can be used in particular. The pivoting movement of the rocker required for the drive can also be arranged to be spatially separated from the region of the comminuted crop material.

The rocker can have a slot-shaped recess - in particular, a slot-shaped opening - in which the connecting piece engages. In this way, a simple guidance and connection of the connecting piece in or with the rocker is configured. In this case, the pivot axis of the rocker can coincide with the transverse direction.

Preferably, the adjusting device has a rotary shaft, which extends in particular in the transverse direction and is rotatable about the transverse direction, which rotary shaft is connected to the rocker for conjoint rotation. In order to increase the mechanical stability, the shaft can be held on the housing of the apparatus via several bearings. By means of the rotary shaft, an adjustment thereof, taking place at one end of the pivot rail, can be transmitted to the other end by means of an actuating cylinder arranged to the side, without synchronizations being required.

In particularly advantageous embodiments, two pivotable rockers are arranged on both outer sides of the rotary shaft, lying opposite one another in the transverse direction, each of which is connected to the cutting device via a connecting piece. In this way, the cutting device is mechanically driven at two points opposite one another in the transverse direction, and there is a reduction in the point load on the cutting device as a result of the driving force.

In order to avoid mechanical stresses as a result of a non-uniform drive of the ends of the cutting rail, actuating cylinders or servomotors can also be provided at both ends of the cutting rail, which bring about a force which is always of the same size, in the same direction on the cutting device. For this purpose, a synchronization device can be provided, so that a force or direction gradient can be compensated for. Preferably, this compensation can be achieved in a hydraulically or electrically controlled manner.

In a further advantageous embodiment, the adjusting device has at least one - in particular, U-shaped and pivotable - lever, which is connected to the rotary shaft for conjoint rotation - preferably along the entire cross-section of the rotary shaft. As a result of the frictional or form-fitting design of the connection of the lever to the rotary shaft, the rotary shaft can be caused, by the lever, to rotate about its (transverse) axis.

The actuating cylinder can be fixed to the housing, and the piston can be connected to the lever.

The piston or the actuating cylinder can be controlled by a user - in particular, during operation of the apparatus - so that a movement of the actuating cylinder, via the lever, causes a rotation of the rotary shaft.

For better operability, the actuating cylinder can have, at least in portions, a marking - preferably in the form of regular color differences along its length - which is associated with the current position of the actuating cylinder relative to the piston and can be viewed from the outside - in particular, from a driver's cab - by the user of the apparatus during operation.

In this way, the current deflection of the hydraulic piston, which in particular corresponds to the current position of the cutting rail, can be seen by the user - in particular, from the driver's cab of a pulling/carrying vehicle - from the outside, with minimal effort. Thus, the position of the cutting bar can be finely adjusted by the user at any time during operation.

According to the invention, the adjusting device has an actuating cylinder which is mounted in a linearly-movable manner relative to a piston. Thus, the cutting bar is adjusted by means of a linear movement by means of the actuating cylinder or the piston. In this version, the actuation is carried out directly by the actuating cylinder or piston.

Alternatively, the actuating cylinder or the piston can be connected to a side wall of the apparatus, and in particular to a wall of the housing of the apparatus. In this way, the housing is used as an abutment for the actuating cylinder or piston. In a simple embodiment, the actuating cylinder is able to be screwed to the side wall of the apparatus by means of a holding part. The piston and/or actuating cylinder are then in each case connected indirectly or directly to the cutting rail. The adjustment path of the actuating cylinder, and/or its stroke, can be presettable by the user by means of the screw movement.

Alternatively, the adjusting device can have two actuating cylinders which are each mounted displaceably relative to their piston. Both actuating cylinders can be connected to the cutting device on sides, which are opposite one another in the transverse direction, of said device such that a symmetrical

structure results. In this embodiment, it is necessary, in order to reduce shear forces, for the same force to then be applied to both actuating cylinders. This can be accomplished by a synchronization apparatus of the type already mentioned - in particular, in an electrical/hydraulic manner.

In a highly preferred embodiment, the apparatus has a position measuring unit for measuring the position of the cutting rail. In this way, the current position of the cutting rail can be measured at any time and be controlled by the user. In this case, the position measuring unit can be designed as a potentiometer, and in particular as a rotational angle potentiometer, by means of which the pivot position of the rocker can be measured. The resulting measurements can be made available to the user - in particular, during the operation of the apparatus - by means of a display.

A preferred development provides that the cutting device have guide spaces for cleaning the adjustment path of the cutting rail. The guide spaces run in guide slots of the cutting rail and guide these in this way; at the same time, they clear the guide slots of accumulating dirt by means of oblique surfaces.

Further advantages and features of the invention can be found in the claims and in the following description, in which embodiments of the invention are explained in detail with reference to the drawings. In the drawings:

Fig. 1 is a side view of a working apparatus according to the invention when the side cover of the mulching apparatus housing is removed;

Fig. 2 is an enlarged view of a cutting device of the apparatus of Fig. 1;

Fig. 3 is a view of the cutting device from Fig. 2 obliquely from below;

Fig. 4 is an enlarged view of the cutting device with connecting piece and adjusting device;

Fig. 5 is a further side view of the adjusting device;

Fig. 6 is an overall view of the adjusting device, obliquely from above;

Fig. 7 is an enlarged view of the adjusting device of Fig. 6 in a view obliquely from above;

Fig. 8 shows a further embodiment of the adjusting device;

Fig. 9 is a side view of a further embodiment of the adjusting device;

Figs. 10-12 show an actuation of the adjusting device of Fig. 9;

Fig. 13 shows an alternative embodiment of the adjusting device, and

Figs. 14-16 show an actuation of the adjusting device of Fig. 13.

Fig. 1 shows an agricultural working apparatus 1 according to the invention in the form of a mulching apparatus, which can be connected in a conventional manner to a pulling device - for example, a tractor (not shown). The mulching apparatus 1 has a support roller 2, as well as a working rotor 3 having flails 3.1, a cutting device 4, and a pivotable protective plate 5.

When the mulching apparatus 1 moves in the direction of travel X (to the left in Fig. 1) during operation, the working rotor 3 separates, by means of its flail 3.1, the growth, to be comminuted, as cut material from the ground, and guides said material past the cutting device 4. The cutting device 4 has in particular a cutting rail 6 which is shown enlarged in Fig. 2 and which extends substantially along the transverse direction Y of the mulching apparatus 1, wherein the transverse direction Y is oriented horizontally and is perpendicular to the direction of travel X of the mulching apparatus 1.

The cutting rail 6 comminutes the separated and received, or also only received, already previously separated, vegetation, which is subsequently fed first upwards, and then behind the working rotor 3 and downwards back to the ground, by the rotational movement of the working rotor 3. In this case, the distance between the cutting rail 6 and the working rotor 3 determines the size of the comminuted cut material. It supports the mulching apparatus 1 with respect to the ground. By means of adjustable guide plates (not shown) arranged above the

transition region of the working rotor 3 and the support roller 2, the cut material can be deposited in front of the support roller 2 or conveyed beyond it.

Fig. 2 is an enlarged view of the cutting device 4 according to the invention of Fig. 1. The cutting rail 6 is located at a great distance from the working rotor 3. It can be moved substantially counter to and in the direction of travel Y by means of an adjusting device 14, in such a way that the gap between the cutting rail 6 and the working rotor 3 can be changed.

The latter is, by means of screws 8, connected slidingly, between a lower leg 11.1 of the angle section 11 and a sliding plate 7 fixed to the housing, to an angle section 11. Counter plates 9 are provided between the sliding plate 7 and the heads of the screws 8. The aforementioned parts are held on the angle section by screws 9.1.

Guide spaces 10 surround the screws 7.a. They run in guide slots of the cutting rail 6 provided for this purpose and guide these; they simultaneously clear the guide slots, by means of oblique surfaces 10.1, from accumulating dirt.

Fig. 3 shows the cutting device 4 of Fig. 2 in an oblique view from below. Counter plates 9, which are aligned with one another in the transverse direction Y and are held by the screws 10, are arranged below the cutting rail 6, over the entire width of the cutting rail 6.

Fig. 4 shows the connection of the cutting device 4 by means of a connecting piece 13 with an adjusting device 14. The connecting piece 13 is designed as a bolt which is fixedly connected to the cutting device 4. On its side facing away from the cutting device 4, the bolt 13 engages through a depression in the form of a slot-shaped recess of the adjusting device 14, which has a rocker 17 which is pivotable about the transverse direction Y.

A sliding block 18 and a spring element 19 are arranged between the wall, surrounding the recess 16, of the rocker 17 and the bolt 13. The spring element 19 is an enclosure of the sliding block 18 made of a resilient material (plastic) and serves to cushion relative movements between the bolt 13 and the

rocker 17. The sliding block 18 allows for low-friction guidance of the bolt 13 within the recess 16 of the rocker 17.

If the rocker 17 is pivoted about the transverse direction Y, the bolt 13 moves linearly within the slot-shaped recess 16, and in this way brings about an adjustment of the cutting device 4 counter to or in the direction of travel X to or from the working rotor 3.

Fig. 5 is a view of the adjusting device similar to Fig. 4, showing further components thereof. It can be seen that the rocker 17 is connected to a rotary shaft 23 (not visible in Fig. 5), for conjoint rotation, on a region 21 facing away from the bolt 13, by means of three screws/rivets 22. The basic orientation of the rocker 17 with respect to the rotary shaft 23 can be fixedly set by the slots of the rocker 17, through which the lower and the upper screws reach. It can be seen from Fig. 8 that the cutting rail 6 can likewise be connected, at the other end thereof, to the rotary shaft 23 in the same way, by means of a rocker 17, the only difference given here being that the bolt 13 reaches directly through the corresponding slot of the rocker 17 without an interposed sliding block, which can also be provided in principle.

Fig. 6 shows the working apparatus 1 in a view from above. The connection, for conjoint rotation of the rocker 17 to the rotary shaft 23, extending in the transverse direction, is visible. The rotary shaft 23 is rotatable about the transverse direction Y and extends in its longitudinal direction over the width of the working apparatus 1. A U-shaped lever 25 is connected to the rotary shaft 23, for conjoint rotation, at the end region 24, facing the rocker 17, of the rotary shaft 23.

Fig. 7 shows the lever 25 in an enlarged view obliquely from above. The lever 25 has a two-part configuration, by means of which the rotary shaft 23 is engaged for conjoint rotation along its entire cross-section. On the side, facing away from the rotary shaft 23, of the lever 25, the lever 25 is connected in an articulated manner to a piston 26 of an actuating cylinder 27 and is pivotable thereby. The actuating cylinder is preferably a hydraulic cylinder; the working means is therefore hydraulic oil. The piston 26 is guided in a linearly-movable manner in the hydraulic cylinder 27. The hydraulic cylinder 27 is fixedly connected to the housing 12. On its

lateral surface 28, the actuating cylinder 27 has a scale, which is arranged under a rod 26.1, which is connected to the free end of the piston 26 and moves backwards over the hydraulic cylinder, and which indicates the movement state of the piston 26 in the actuating cylinder 27. The scale 28 can be seen from the outside by the driver during operation of the mulching apparatus 1.

During the operation of the mulching apparatus 1, the driver can actuate the actuating cylinder 27 by way of a remote control (not shown), and linearly approach the piston 26, which is expressed in a pivoting movement of the lever 25 about the rotary shaft 23. As a result, the rotary shaft 23 itself is moved in rotation about the transverse direction Y, as a result of which the rocker 17 is pivoted about the transverse direction Y. As a result, as already described, the bolt 13, and, with it, the cutting device 4, is moved linearly such that the distance of the cutting rail 6 in relation to the working rotor 3 is changed.

Fig. 8 shows an alternative determination of the approach position of the cutting rail 6. For this purpose, a position measuring unit 31 is arranged laterally next to the rocker 17 and is connected to the rocker 17 by means of an articulated bracket 32. Position measuring unit 31 is designed, for example, as a rotary potentiometer 33 and is fastened to an outer holding plate 34. The outer holding plate 34 furthermore has a recess 35 through which the rotary shaft 23 grips. The pivot state of the rocker 17 can be measured electronically at any time by means of the rotary potentiometer 33 and is displayed to the driver/user in the driver's cab via a corresponding instrument.

Fig. 9 shows a further embodiment of the working apparatus 1 according to the invention in a view obliquely from above and from the outside, wherein the outer wall of the mulching housing 12 is shown transparently in order to free the view of the interior of the housing 12. In the left-hand region of Fig. 10, the working rotor 3 can be seen, at a distance from which the cutting rail 6 of the cutting device 4 is arranged. A connecting piece, corresponding to the connecting piece 13 of the embodiment described above, in the form of an adapter plate 36 is integrally formed on an end region of the cutting rail 6, perpendicularly to the main extension direction of the cutting rail 6, which cutting rail is located to the side in

the transverse direction Y. The adapter plate 36 has two holes 36a, provided with threads, which serve to fasten the cutting device 4 to the adjusting device 14.

As shown in Fig. 9, the adjusting device 14 is preferably designed as a hydraulic cylinder 38 having a piston 37, wherein the hydraulic piston 37 is guided in a linearly-movable manner in the actuating cylinder 38. The piston 37 has a thread 39 on its end facing away from the actuating cylinder 38, by means of which thread the hydraulic piston 37 is fixed in a holder 40 which is fixedly mounted on the inner wall (not shown in Fig. 9) of the mulching housing 12.

The actuating cylinder 38 has, at the height of the holes 36a, two fastening elements 41 provided with threads, which elements are designed as plates and by means of which the actuating cylinder 38 can be fastened to the adapter plate 36. In this embodiment, the piston 37 is therefore fixed to the housing, and the hydraulic cylinder 38 is arranged movably with the cutting rail 6. The arrangement can also be selected so as to be reversed.

When the actuating cylinder 38 is actuated via an actuating apparatus (not shown in Fig. 9) in the driver housing of the vehicle on which the apparatus 1 is connected, the actuating cylinder 38 moves linearly along the direction of travel X or counter thereto and causes, by means of its connection to the adapter plate 36, the cutting rail 6 of the cutting device 4 to move in parallel.

By means of the possibility of screwing the hydraulic piston 37 in the holder 40 onto the mulcher housing 12, both the starting position and the stroke of the actuating cylinder 38 can be set by the user before the apparatus 1 is operated. In this embodiment, the adjusting device in each case has a hydraulic cylinder 38 having a piston 37 at each end of the cutting rail 6. Thus, a total of two hydraulic cylinders with pistons are provided.

A synchronous movement of the hydraulic cylinders can be brought about hydraulically, in which one of the cylinders serves as a pattern, and the other as a rail.

The synchronization can also be brought about, via sensors and actuators, by means of an - electrical - control.

The mode of operation of the embodiment shown in Fig. 9 is shown in Figs. 10 through 12. Fig. 10 shows one actuating cylinder 38 in a position in which it is moved maximally to the left on the working rotor, such that the piston 37 is located largely in the hydraulic cylinder 38. In this position, the cutting rail 6 is maximally extended, and the distance between the cutting rail 6 and the working rotor 3 is minimal. When the actuating cylinders 38 are actuated, they move linearly to the right in the transition from Figs. 10 through 12, as a result of which the cutting rail 6 is continuously retracted until, in Fig. 12, the actuating cylinder 38 reaches its maximally deflected position, and the cutting rail 6 has been maximally retracted.

Fig. 13 shows a further embodiment of the apparatus according to the invention in a view similar to Fig. 9. As in the previous embodiment, the cutting rail 6 has, at its end region located to the side in the transverse direction, an adapter plate 36, which is provided with holes 36a and is fastened to a hydraulic cylinder 38a. The hydraulic cylinder 38a is likewise linearly movable relative to its piston 37a, which is fastened between two brackets 41 fastened to the mulcher housing 12 (not shown). A cylindrical projection 42 is integrally formed on the part, facing the mulcher housing 12, of the lateral surface of the hydraulic cylinder 38a, which projection 42, similarly to the first variant already shown, extends through the recess 16 of the pivotable rocker 17 arranged to the side of the cutting rail 6. In this case, as already shown, the rocker 17 is connected for conjoint rotation to the rotary shaft 23 extending in the transverse direction.

In the embodiment shown in Fig. 13, the actuating cylinder 38a is driven passively by means of the rocker 17 and is not directly actuatable. In the embodiment shown in Fig. 13, a forced guidance at the ends of the cutting rail is brought about via a rotary shaft, either purely mechanically by means of a spring-loaded sliding block as in the embodiment of Figs. 1 through 8 with reference to the latter described above, or by means of a forced synchronization, via the rotary shaft, of hydraulic cylinders, arranged at both ends of the cutting rail 6, and the rotary shaft. The movement of the hydraulic cylinder 38a, and thus of the cutting rail 6, is shown in Figs. 14 through 16. In Fig. 14, the cutting rail 6 is shown in its maximally retracted position, and the hydraulic cylinder 38a is deflected maximally to the right, wherein a right angle 41, shown in Fig. 14, serves as a stop for the hydraulic

cylinder 38a. A lateral cam 42 on the hydraulic cylinder 38a engages in a slot of the rocker 17 and is located at the upper end of the slot of the rocker 17. If the hydraulic cylinder is moved, it pivots the rocker 17, and the rotary shaft with it, about the transverse direction Y, as a result of which the lower end of the cutting rail is carried along. The movement is shown in the transition from Fig. 14 to Fig. 16. The cam 42 moves downwards in the slot. As a result of the movement of the hydraulic cylinder 38a, the cutting rail 6 moves forwards, in the direction of travel X, onto the working rotor (not shown). The maximally extended position of the cutting rail 6 is shown in Fig. 16, in which position the hydraulic cylinder 38a is moved maximally to the left. The angle 41 arranged on the left in Fig. 16 serves as a stop for this position. The cam 42 of the hydraulic cylinder 38a is located at the lower end of the slot-shaped recess 16 of the rocker 17. In all movement processes, the actuating piston 37a remains clamped between the two brackets 41.

Patentkrav

1. Landbrugsarbejdsindretning (1) til bearbejdning af biomasse, såsom plantedele, i form af en mulching-indretning, med en støttevalse (2), en arbejdsrotor (3) med slagler (3.1), en skæreindretning (4), der omfatter en skæreskinne (6), og med en indstillingsindretning (14) til indstilling af den mindst ene skæreskinne (6), hvor skæreskinnen (6) har en afstand til arbejdsrotoren (3, 3.1), der bestemmer størrelsen på findelt skæremateriale, hvor skæreskinnen (6) kan indstilles lineært i og mod kørselsretningen ved hjælp af indstillingsindretningen (14), hvor skæreindretningen (4) omfatter et forbindelsesstykke (13, 35), der er anbragt i siden i den tværgående retning (Y), og ved hjælp af hvilket skæreskinnen (6) er forbundet med indstillingsindretningen (14), og hvor indstillingsindretningen (14) omfatter en stillecylinder (27, 38), hvori et stempel (26, 37) er monteret forskydeligt.

2. Indretning ifølge krav 1, **kendetegnet ved, at** skæreindretningen (4) har mindst en især pladeformet holder (7, 9), der bærer skæreskinnen (6).

3. Indretning ifølge et af kravene 1 eller 2, **kendetegnet ved, at** forbindelsesstykket (13) har en bolt (13), der er fastgjort på skæreskinnen (6) og griber ind i en fordybning, især i en udsparing (15), af indstillingsindretningen (14).

4. Indretning ifølge krav 3, **kendetegnet ved, at** der i fordybningen (15) er anbragt en glidesten (18) mellem bolten (13) og indstillingsindretningen (14).

5. Indretning ifølge krav 4, **kendetegnet ved, at** glidestenen (18) har et fjederelement (19), der især er en elastisk indfatning (19) af glidestenen (18), der omgiver denne.

6. Indretning ifølge et af de foregående krav, **kendetegnet ved, at** forbindelsesstykket (13) har mindst en adapterplade (35), der er forbundet med indstillingsindretningen (14).

7. Indretning ifølge et af kravene 1 til 6, **kendetegnet ved, at** indstillingsindretningen (14) omfatter en drejelig vippearm (17).

8. Indretning ifølge krav 7, **kendetegnet ved, at** vippearmen (17) har en langhulsformet udsparing (16), især en langhulsformet gennembrydning, som forbindelsesstykket (13) griber ind i.

9. Indretning ifølge krav 7 eller 8, **kendetegnet ved, at** indstillingsindretningen (14) omfatter en drejeaksel (23), der især strækker sig i den tværgående retning (Y) og omkring den tværgående retning (Y), og som er drejefast forbundet med vippearmen (17).

10. Indretning ifølge krav 9, **kendetegnet ved, at** indstillingsindretningen (14) har mindst en arm (25), der er drejefast forbundet med drejeakslen (23), fortrinsvis langs hele drejeakslens (23) tværsnit, hvor armen (25) især er udformet bøjleformet og drejelig.

11. Indretning ifølge krav 10, **kendetegnet ved, at** stemplet (26) er anbragt lineært bevægeligt, hvor stillecylinderen (27) er forbundet med armen (25), og stemplet (26) er fastgjort til huset.

12. Indretning ifølge krav 11, **kendetegnet ved, at** den hydrauliske cylinder (27) i det mindste afsnitsvist har en markering (28), fortrinsvis i form af regelmæssige farveforskelle langs sin længde, den aktuelle position af den hydrauliske cylinder (27) er tilordnet i forhold til stemplet (26) og kan ses udefra under driften af brugeren af indretningen (1), især fra en førerkabine.

13. Indretning ifølge et af de foregående krav, **kendetegnet ved, at** stillecylinderen er forbundet med indretningen (1) fastgjort til huset.

14. Indretning ifølge et af de foregående krav, **kendetegnet ved, at** indretningen (1) har en positionsmåleenhed (31) til at måle skæreskinnens (6) position.

15. Indretning ifølge krav 14, **kendetegnet ved, at** positionsmåleenheden (31) er udformet som potentiometer (33), især som et drejevinkel-potentiometer (33), ved hjælp af hvilket vippearmens (17) drejeposition kan måles.

16. Indretning ifølge krav 15, **kendetegnet ved, at** skæreindretningen (4) har føringsrum (10) til rengøring af skæreskinnens (6) indstillingsvej.

Fig. 1

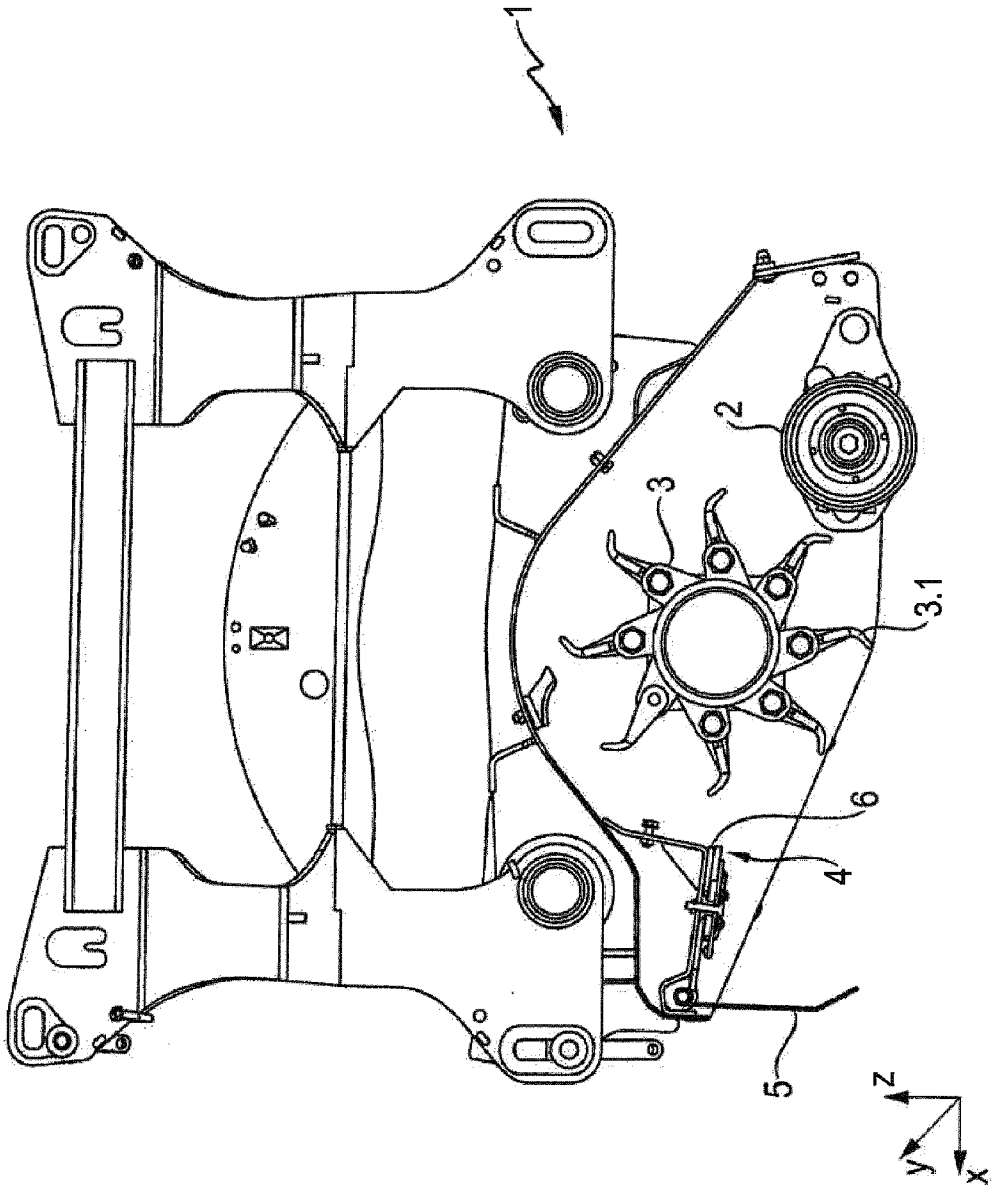
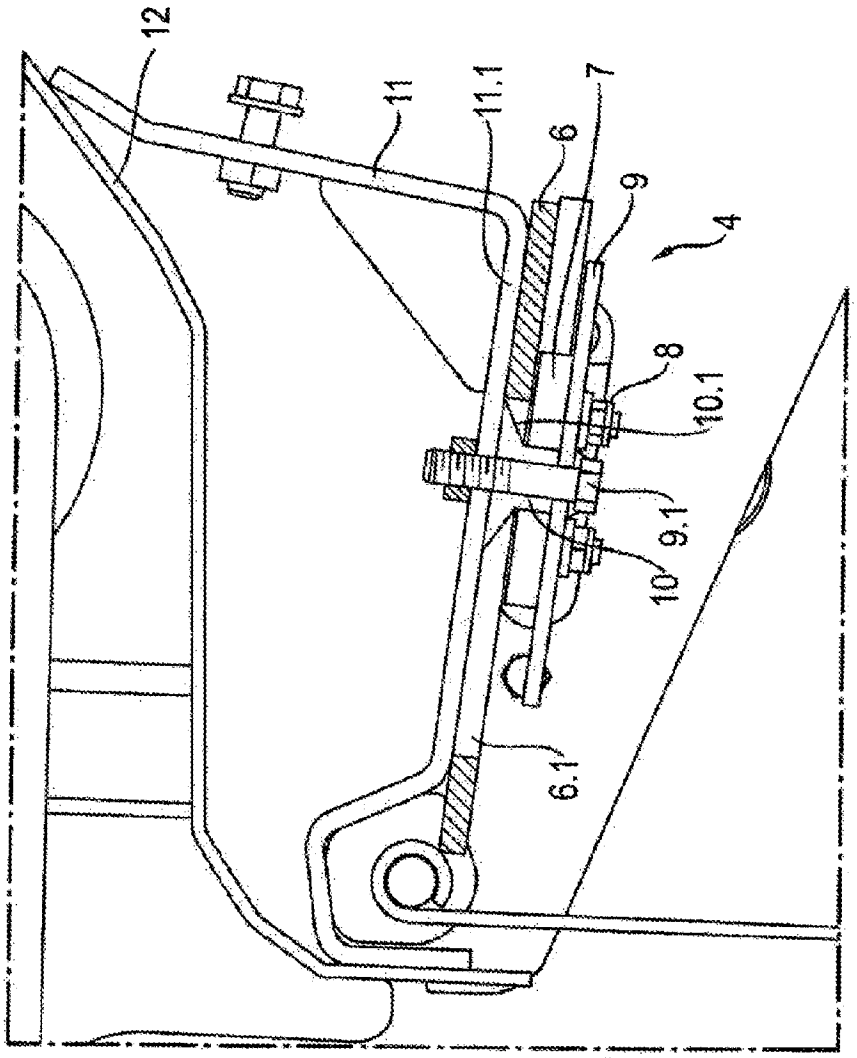


Fig. 2



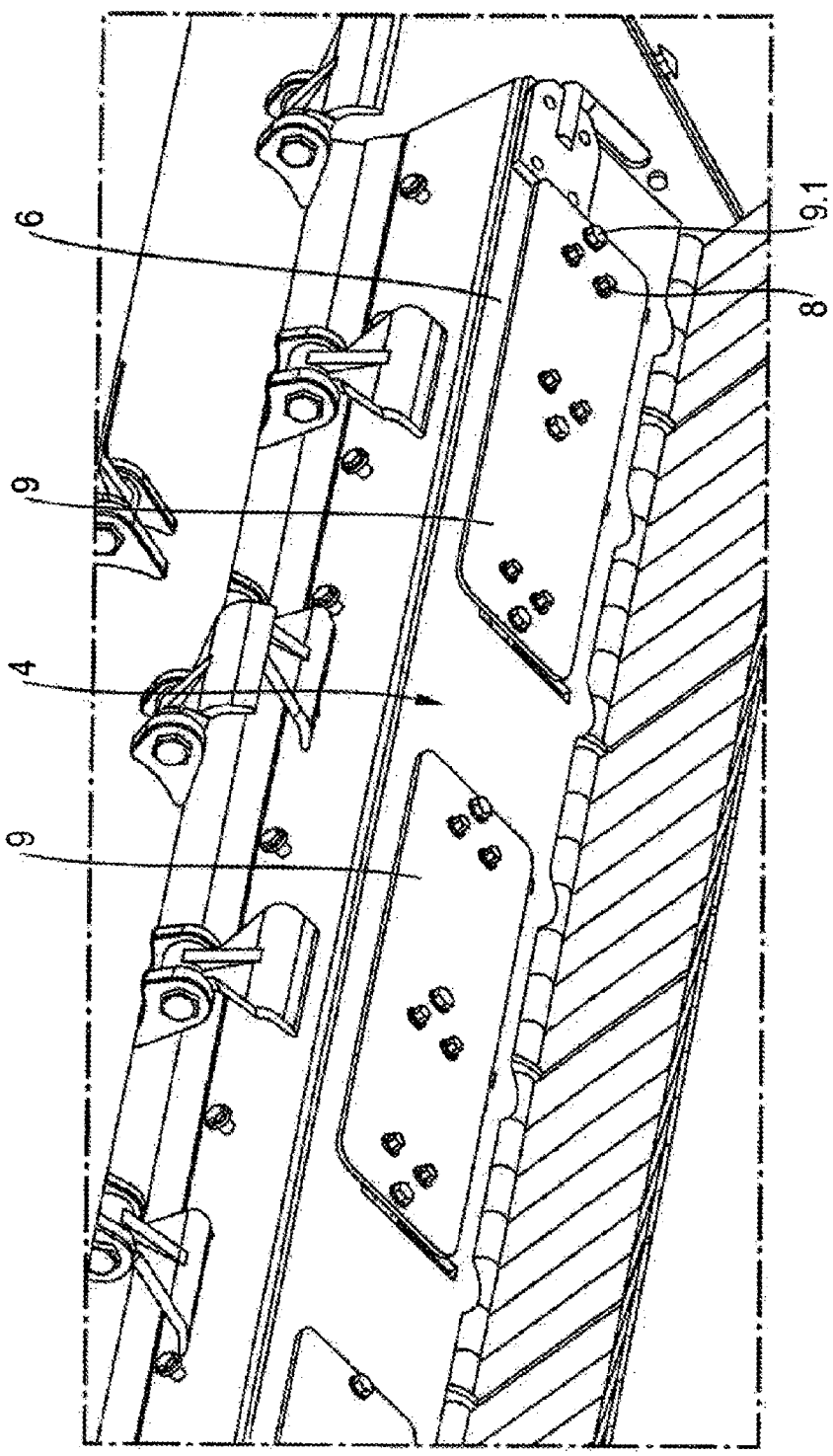


Fig. 3

Fig. 4

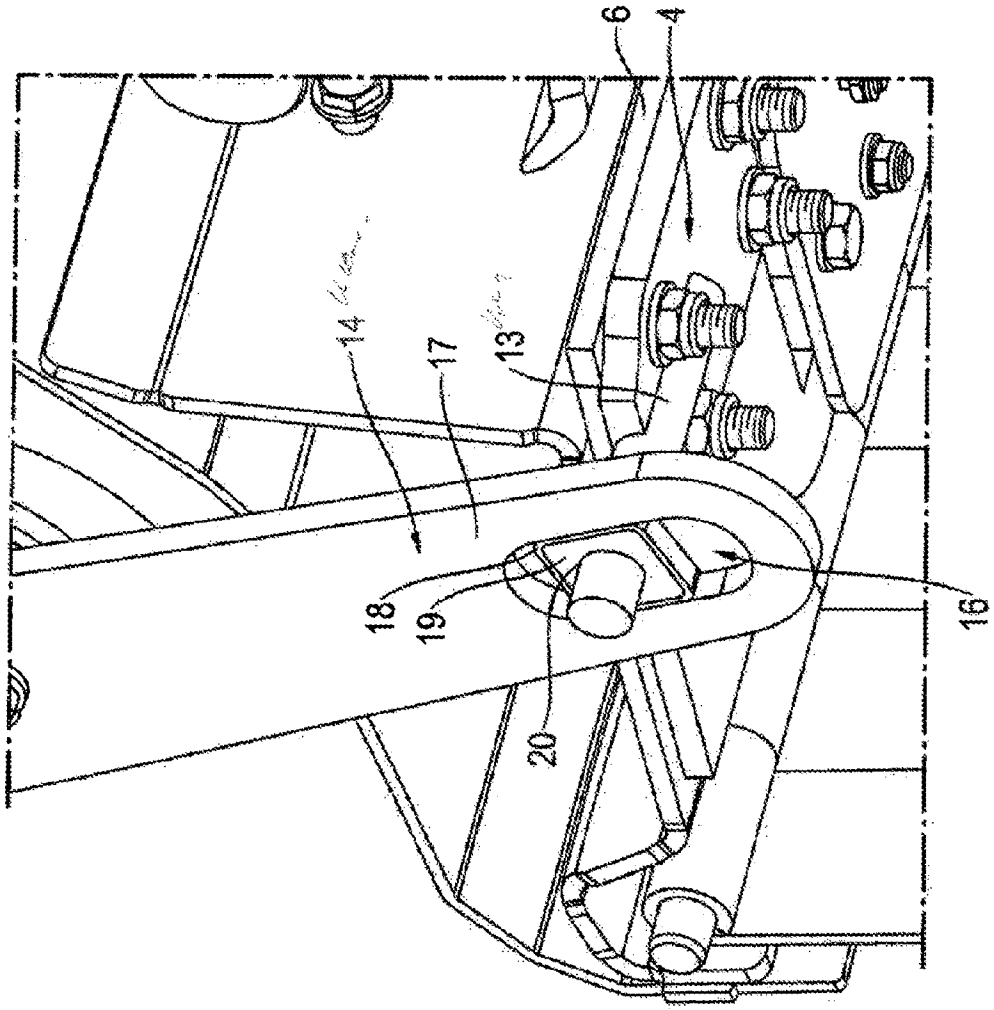
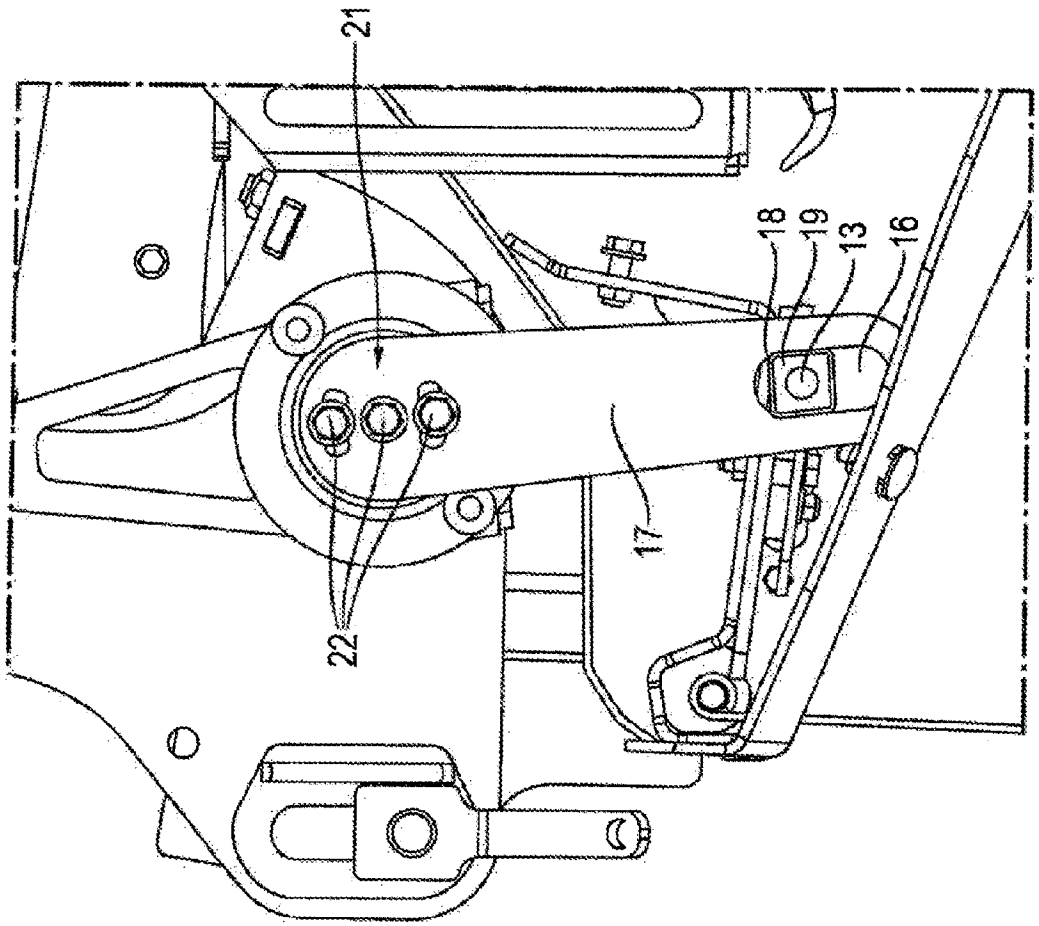


Fig. 5



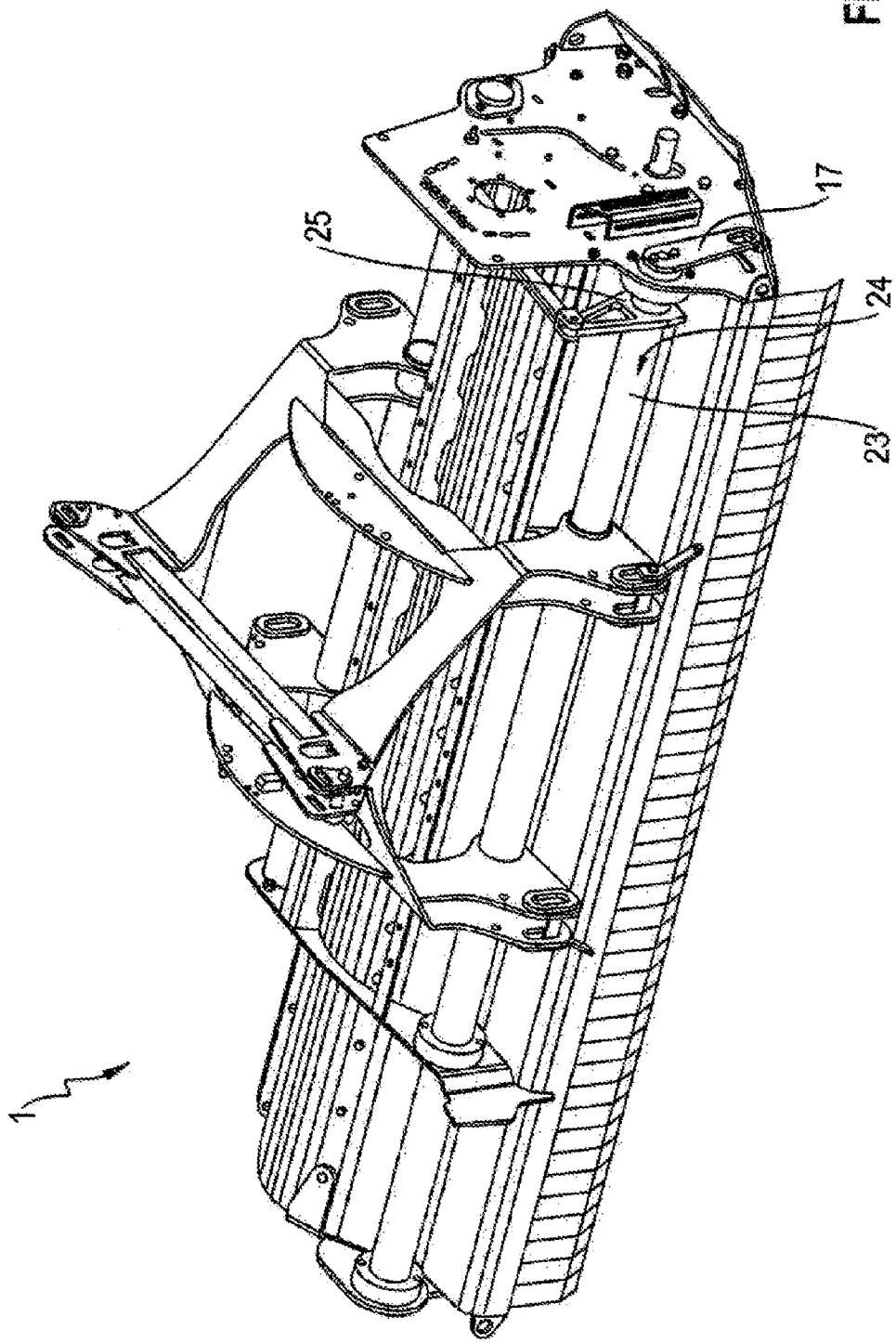


Fig. 6

Fig. 7

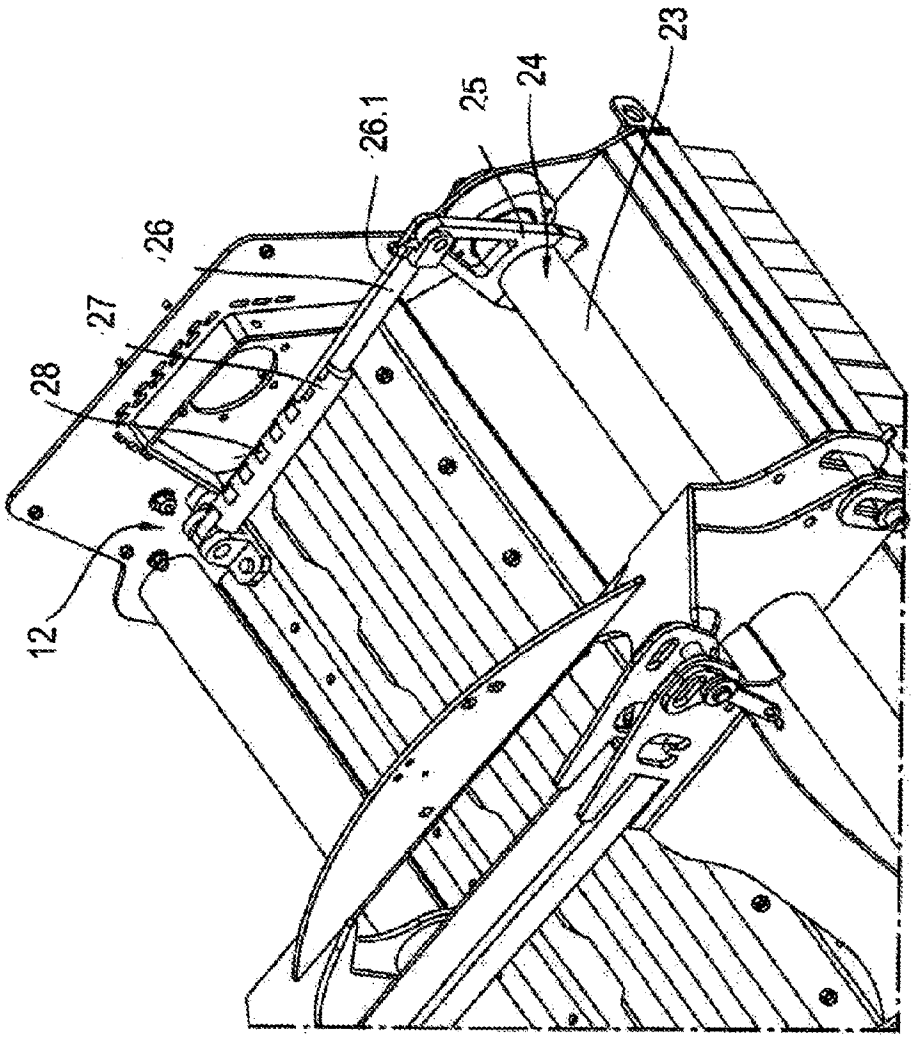


Fig. 8

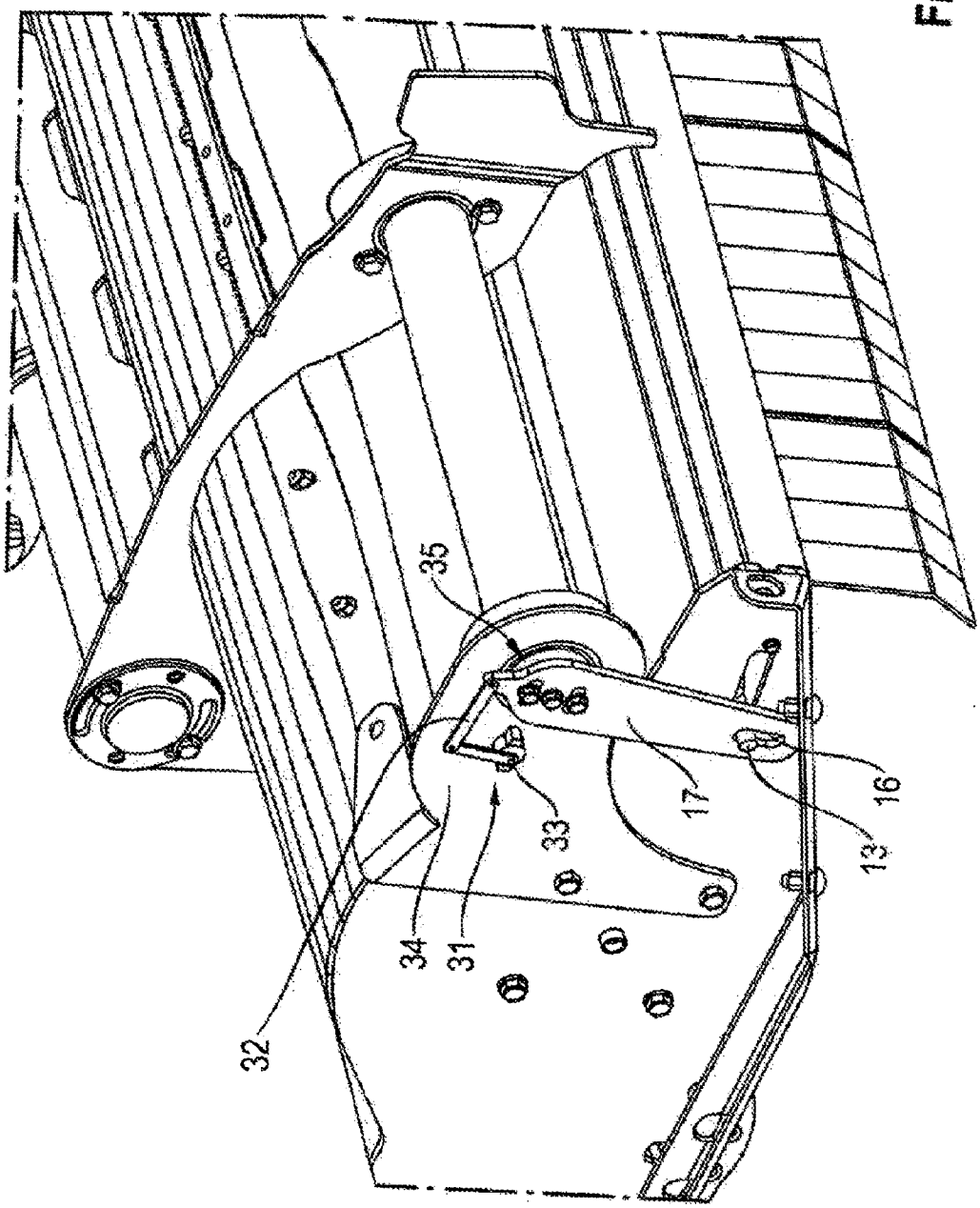


Fig.9

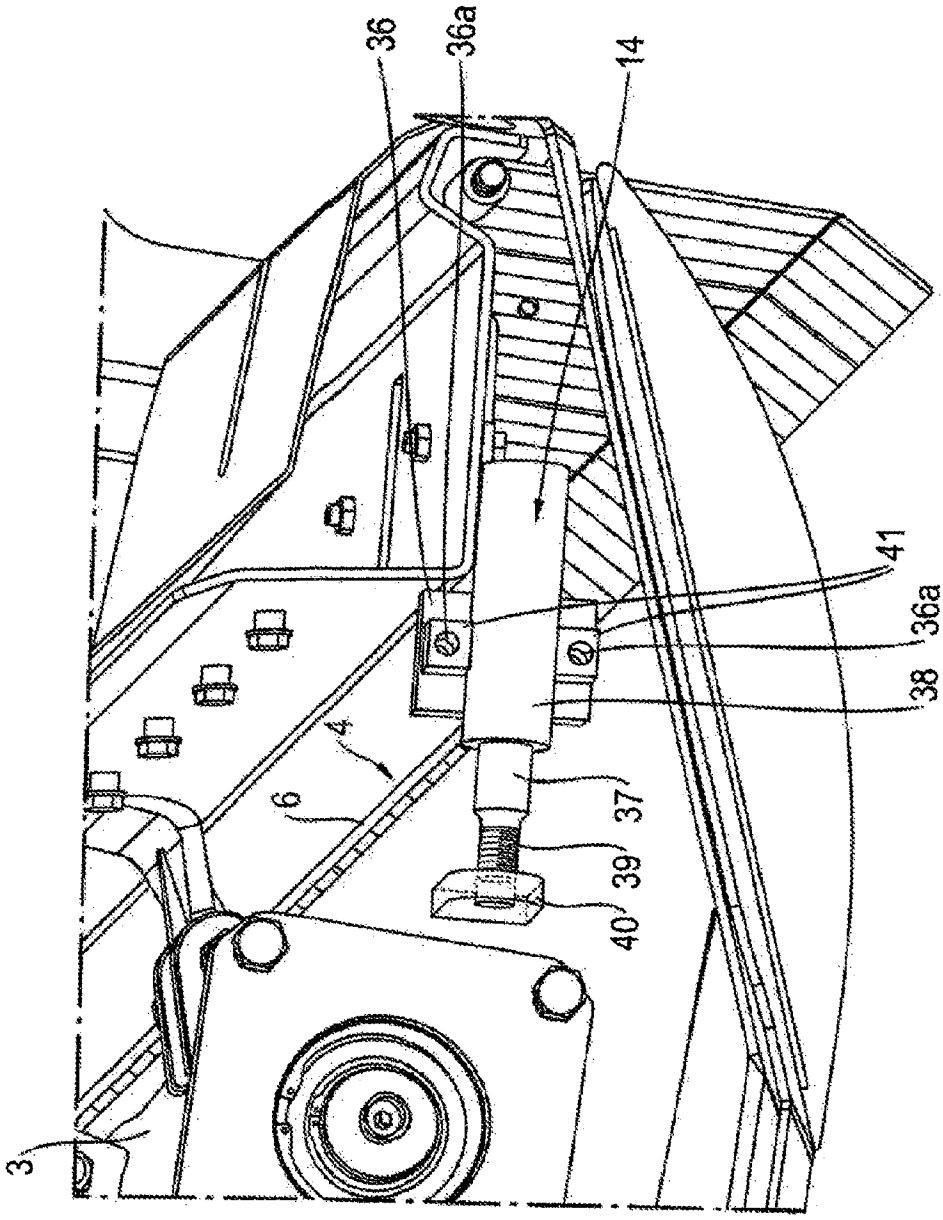


Fig. 10

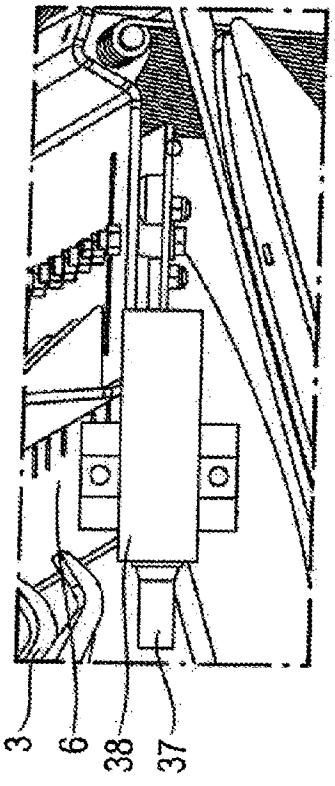


Fig. 11

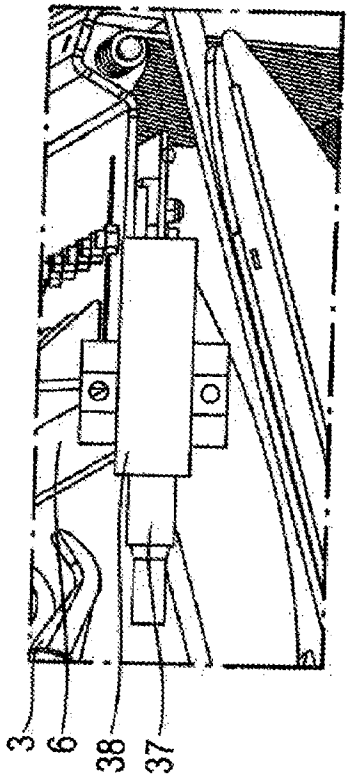


Fig. 12

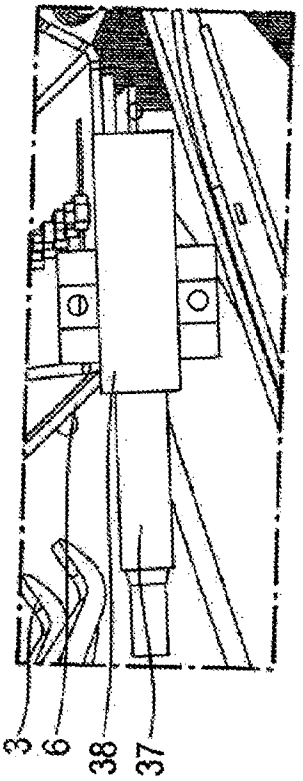
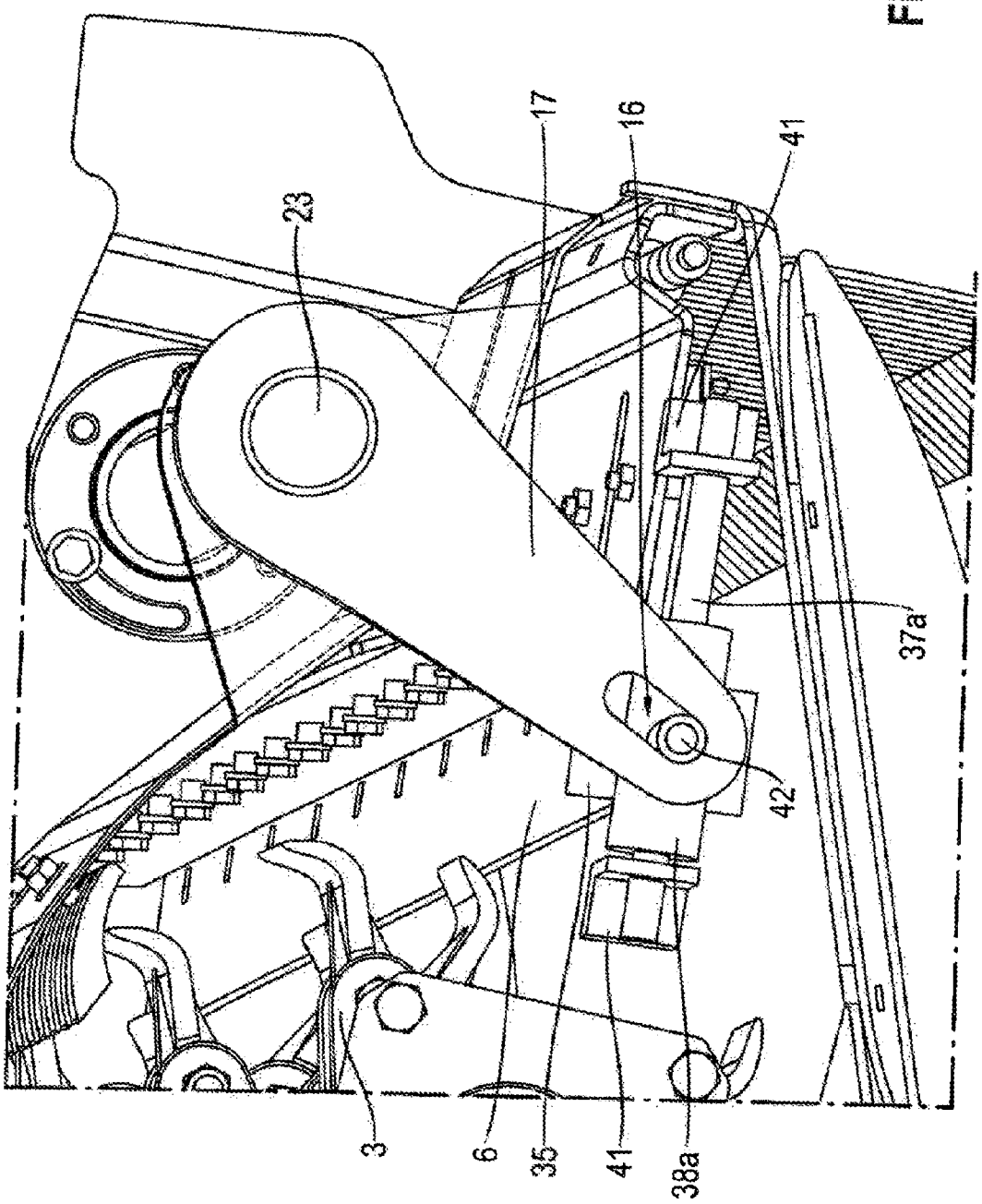


Fig. 13



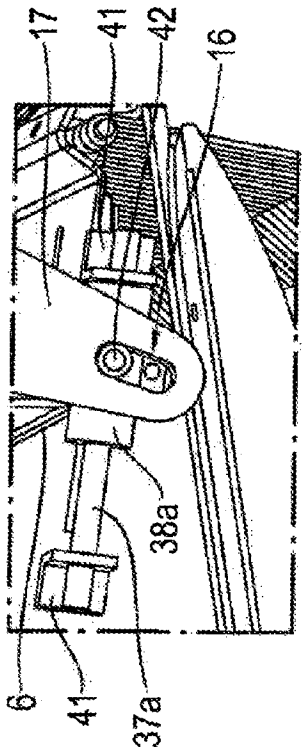


Fig. 14

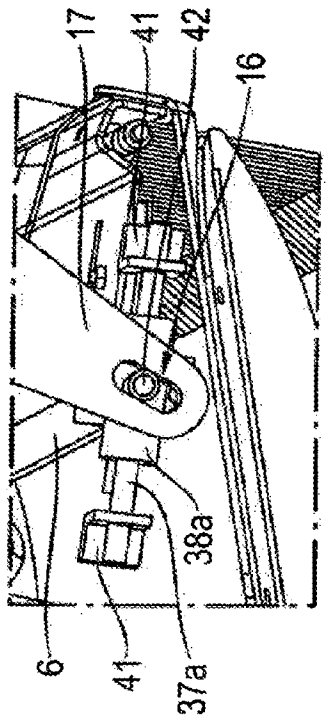


Fig. 15

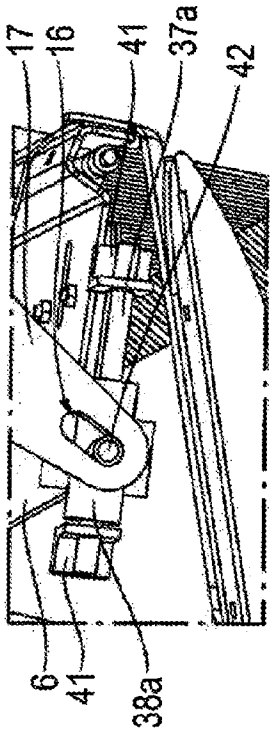


Fig. 16