(19) DANMARK

(10) DK/EP 2260687 T3

Patent- og Varemærkestyrelsen

(12) Oversættelse af europæisk patentskrift

(51) Int.Cl.: ***A 01 B 59/06 (2006.01)***

(45) Oversættelsen bekendtgjort den: **2016-10-17**

(80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2016-07-20**

(86) Europæisk ansøgning nr.: **10006001.1**

(86) Europæisk indleveringsdag: **2010-06-10**

(87) Den europæiske ansøgnings publiceringsdag: **2010-12-15**

(30) Prioritet: **2009-06-10 DE 102009024437**

(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 SE SI SK SM TR**

(73) Patenthaver: **Lemken GmbH & Co. KG, Weseler Strasse 5, 46519 Alpen, Tyskland**

(72) Opfinder: **Basten, Alexander, Spingel 9, 54338 Schweich-Issel, Tyskland**
Boeging, Michael, Langfördener Straße 45, 49424 Lutten-Goldenstedt, Tyskland
Giesen, Gottfried, Lemkenweg 1, 46519 Alpen, Tyskland

(74) Fuldmægtig i Danmark: **Patentgruppen A/S, Arosgården, Åboulevarden 31, 8000 Århus C, Danmark**

(54) Benævnelse: **PÅMONTERINGSTÅRN TIL HÆKMONTERET REDSKAB**

(56) Fremdragne publikationer:
DE-A1- 10 011 401
DE-A1- 19 515 253

Description

[0001] The invention relates to an attachment tower for rear mounted implements such as mounted field sprayers. A generic attachment tower is known from DE 100 11 401A1.

[0002] Such attachment towers have coupling points which enable the attachment of the rear mounted implements to the three-point linkage of the tractor. This type of three-point linkage corresponds to the interface between the tractor and the implement usually according to the International Standard ISO 730-1. Based on this standard, there are various coupling systems facilitating attachment to the tractor. These are single-phase or multi-phase quick coupling systems in accordance with ISO 11001-1, ISO 11001-2, ISO 11001-3 and ISO 11001-4. These coupling systems simplify the attachment of a rear mounted implement to the three-point linkage of the tractor, but, in fact, leave very little space after the attachment for the connection e.g. of the drive shaft of a rear mounted implement, to the tractor PTO shaft or electric cables and hydraulic hoses of hydraulic or electrical devices on the tractor. Where sufficient space is provided between the tractor and the rear mounted implement in these coupling systems, then there is a problem with a relatively unfavorable center of gravity distance from the unit to the tractor. A correspondingly heavier and more powerful tractor needs to be used to accept such a rear mounted implement. In addition to the high weight, such tractors are also expensive, which hampers the economic use of such a rear mounted implement, while soil protection is negatively affected.

[0003] The invention has for its object the provision of an attachment tower for rear mounted implements, allowing easy mounting of the rear mounted implements on the three-point linkage of a tractor, as well as also allowing a compact and favorable center of gravity of the mounted implement on the tractor.

[0004] The object of the invention is achieved by the features of claim 1.

[0005] The upper coupling point associated with a component in the manner described, which is movable, is also the coupling position for the connection to the upper link and for locking of the upper coupling point in the working position, and is

variably movable with the upper link mounted on the coupling point. The upper link of the tractor may be easily mounted on the upper coupling point of the rear mounted implement, even if there is still a large distance between the tractor and the rear mounted implement, e.g. 50 cm. The component is so changed in its position that the upper link may be easily coupled to the upper coupling point. The upper link does not need to have its length changed; it may retain its optimal working length setting. Depending on the mobility of the component, the distance between the rear mounted implement and the tractor may be more than 50 cm in the mounting phase of the upper link. After connecting the upper link to the upper coupling point and connecting the drive shaft to the tractor PTO and after connecting all the supply lines of the implement, then the tractor may be moved close to the implement to be mounted, and the connection between the lower links of the tractor and the lower coupling points of the rear mounted implement are prepared as usual. As a result of not only the quick coupling system of the tractor lower link, but also the upper coupling point, being locked in the working position, the implement may be lifted without anyone still needing to be present between the tractor and the rear mounted implement.

[0006] The invention further provides that the component be designed as a rocker arm that may be pivoted into a front coupling position for the connection with the upper link and into a rear operating position with the upper link connected to the upper coupling point, wherein the rocker arm and therefore the upper coupling point as well, are designed to be lockable in the operating position and movable and variable in the coupling position.

[0007] In this embodiment, the upper coupling point is associated with a component which is designed as a rocker arm and, therefore, for example, may be pivoted but not displaced or telescoped. Corrosion frequently occurs in sprayers using liquids. In such cases, the long term reliability of the pivotable components is greater than that of displaceable or telescoping components.

[0008] in particular, it is conceived that the three-point linkage of the tractor comprises a quick coupling system with coupling hooks, for example, the quick coupling system according to ISO 11001-3. The coupling hooks, in particular on the

lower links, considerably facilitate the connection of the lower links with the lower coupling points of the attachment tower.

[0009] The invention further provides that the component or the rocker arm is designed to be automatically lockable in the operating position via a locking system. This embodiment has the advantage that, after attachment of the implement, the upper coupling point need not be locked manually, for example, by means of remote control, but is locked automatically.

[0010] According to the invention, it is further provided that the locking system comprises guide elements to prevent premature locking of the upper coupling point during the coupling phase, to allow limited maneuvering of the tractor during the coupling phase, and to effect locking only when lifting the rear mounted implement. This feature of the invention ensures that after mounting the upper link on the upper coupling point, after connecting the drive shaft to the tractor PTO, and after connecting the supply lines to the appropriate connectors and couplings of the tractor, with the tractor so that it may be moved towards the implement until the upper link may be connected to the lower coupling points via its quick coupling system. The rocker arm and the upper coupling point connected to the rocker arm remain variably movable in this coupling phase and are not locked. Manoeuvring required for connecting the lower links of the tractor with the lower coupling points of the rear mounted implement, is thus possible and is not made difficult by premature locking of the upper coupling point. Only after the lower links of the tractor have been connected to the lower coupling points and the rear mounted implement is lifted, is the upper coupling point locked in the working position.

[0011] The mechanism is preferably so configured that the locking system and the guide elements consist of a coupling hook with a counter hook, wherein the coupling hook with its rear end is pivotably limited about a transverse axis with the attachment tower and the counter hook is pivotably limited about a transverse articulation and is connected with the front end of the coupling hook. The coupling hook and the counter-hooks are so arranged with respect to each other that they do not allow a snap and lock of the upper coupling point when the tractor is moving in the direction of the rear mounted implement for the coupling procedure. However, if the rear

mounted implement is lifted, it is held by the coupling hook, fixed by the counter-hook and then securely locked.

[0012] It is also proposed that a remote control is provided by means of which the locking system is disengaged and thus the rocker arm and the upper coupling point are formed in order to be brought from the working position into the coupling position. When the rocker arm and the upper coupling point are in the working position, they may no longer be disengaged autonomously. The parked rear mounted implement may only be brought again from the working position into the variably movable coupling position via a remote control. In this coupling position, the lower links may be disconnected and moved away with the tractor until there is a sufficient distance between the rear mounted implement and the tractor. When the distance is again great enough, the operator may disconnect the PTO shaft, disconnect the supply lines from the tractor, and disconnect the upper link. To ensure sufficient distance between the tractor and the rear mounted implement for the coupling work, the upper coupling point must be moved horizontally at least 15 cm to 20 cm between the working position and the coupling position. A horizontal movement of the upper coupling point between 30 cm and 60 cm is optimal.

[0013] A preferred variant provides for this purpose in that the remote control is constructed as a traction cable, which is kinematically connected to the coupling hook via a rod. Usually, the quick coupling systems of the lower link are disengaged via traction cables. It is therefore advisable to disengage the upper coupling point via the same method. Systems that may be actuated hydraulically or electrically are also conceivable, but offer no benefits in terms of reliability. This is also a reason that a mechanical system was preferably chosen for the inventive coupling system, and, for example, not a hydraulic system.

[0014] While maintaining the usual quick coupling systems such as, for example, the quick coupling system according to ISO 11001-3, this inventive coupling system of the upper coupling point leads to the fact that rear mounted implements need to be mounted very close to the tractor in order to avoid off-loading the front axle of the tractor too much whille loading the rear axle of the tractor too much, so that it may

be attached to the three-point linkage of a tractor safely, without problem and comfortably.

[0015] Further details of the invention are disclosed in the figures and the figure description.

[0016] In the drawings:

Fig. 1 shows the front of the attachment tower of a mounted field sprayer in its working position,

Fig. 2 shows a section through the upper part of the attachment tower in the coupled position of the upper link,

Fig. 3 shows a section through the upper part of the attachment tower in the coupled position, just prior to locking in the working position, and

Fig. 4 shows a section through the upper part of the attachment tower in the working position.

[0017] Fig. 1 shows the rear mounted implement 2, in this case a mounted field sprayer 3, which comprises the upper coupling point 4 and the lower coupling points 5 and 6 at the front of the attachment tower 1. The lower coupling points 5 and 6 are provided for the lower links of tractors equipped with a quick coupling system and may be automatically and remotely coupled and uncoupled. The upper coupling point 4 is indirectly associated with the upper part 50 of the attachment tower 1, which is in turn secured to the frame 51. The frame 51 supports the container 52 of the mounted field sprayer 3. The pump 53 is arranged under the container 52, and is connected to the PTO of the tractor via an articulated shaft (not shown). The upper coupling point 4 is associated with the component 9 formed as a rocker arm 10 and is located here in the working position 12. In the working position 12, the upper coupling point 4 is locked. The coupling hook 22 and the counter hook 23 are engaged and thus lock the upper coupling point 4. For more details, reference should be made to the other figures, wherein the right outer plate of the outer plates 54 has been hidden in order to show the interior of the upper part 50 of the attachment tower 1 better.

[0018] Fig. 2 shows the upper part 50 of the attachment tower 1 in the coupling position 11. The rocker arm 10, which is pivotally mounted about the axis 13

between the outer plates 54, is pivoted forward to couple the upper link of the tractor. The rocker arm 10 and thus also the upper coupling point 4 are then no longer fixed by the coupling hook 22 and the counter hook 23. The rocker arm 10 may be variably tilted, more or less far forward. Regardless of the length adjustment of the upper link of the tractor, the upper link may thus be simply connected to the upper coupling point. The horizontal distance A in the working direction between the working position 12 and the coupling position 11 of the upper coupling point 4 gives the increased distance that is available to the operator after coupling of the upper link for connecting the drive shaft of the rear mounted implement 2 with the PTO of the tractor and for connecting the supply lines between the tractor and the rear mounted implement 2. The variable mobility of the upper coupling point 4 is somewhat greater than the distance A as options for maneuvering must be available for the mounting of the lower links to the lower coupling points 5 and 6. The coupling hook 22 is in its lower position and lies at the lower end of the slots 55 of the outer plates 54. The counter-hook 23 is also located in its lower position and at the lower end of the slots 38 of the rods 36. The upper part 50 of the attachment tower 1 is bolted to the frame 51 via the screws 61 and 62.

[0019] Fig. 3 shows the upper part 50 of the attachment tower 1 in the coupling position 11, 11', shortly before the locking of the upper coupling point 4 in the working position 12 with the upper link already connected to the upper coupling point 4. For clarity, as mentioned earlier, an outer plate 54 is hidden as is also the upper link of the tractor that is already connected to the upper coupling point 4. The upper coupling point 4 is in the variable movable coupling position 11, in fact, in the coupling position 11', in which the lower coupling points 5, 6 may be coupled. The upper coupling point 4 must be pushed back further behind the attachment tower 1 than is normally required for coupling the lower coupling points 5, 6. It may not then yet be locked, because a coupling of the lower coupling points 5, 6 is not possible. It is ensured that locking is only possible when the coupling operation has been completed via guide elements 21, which are part of a locking system 20. In the working position 12 according to Fig. 4, the upper coupling point 4 is a little further forward and is only fixed in this working position 12 through the recesses 40 of the

coupling hook 22 and the recesses 41 of the counter hook 23. The coupling hook 22 is connected to the upper part 50 of the mounting tower 1 with its rear end 30 via the transverse axis 24. The counter hook 23 is connected via the coupling point 25 to the front end 31 of the coupling hook 22. There are leading edges 37 at the front of the coupling hook 22. When the upper coupling point 4 is inserted in the upper part 50 of the attachment tower 1 during the coupling phase, it abuts against the leading edge 37 and pushes the coupling hook 22, together with counter-hook 23, upwards. In this case, the upper coupling point 4 is pushed back until the lower coupling points 5 and 6 may be coupled. During the manoeuvring procedure required for this, the upper coupling point 4 is not locked because the support surface 65 of the counter hook 23 is supported on the upper coupling point 4 and the counter hook 23 is held high further. The arrangement of the coupling hook 22 and the counter hook 23 in conjunction with the support surface 65 of the counter-hook 23 is so designed that premature locking of the upper coupling point 4 is prevented. An end stop 60 prevents the upper coupling point 4 from being inserted too far into the upper part 50 of the attachment tower 1. This may be seen in Fig. 2. If, after the coupling process of the lower link, the upper coupling point 4 is moved forward again, it runs into the recess 40 of the coupling hook 22. At the same time the counter hook 23 falls down and also comprises the upper coupling point 4 in its recess 41. The upper coupling point 4 is then in the secured and locked working position 12, which is shown in Fig. 4

[0020] Fig. 4 shows how the upper coupling point 4 is firmly fixed between the recesses 40 and 41 of the coupling hook 22 and counter hook 23. This corresponds, as already mentioned, to the working position 12, in which displacement of the upper coupling point 4 is no longer possible. When the rear mounted implement 2 is to be dismounted, the locking system 20 is correspondingly operated via a rod 29. The rod 29 consists, inter alia, of an angle lever 35, a rod 36 and a traction cable 34. The traction cable 34 serves here as a remote control 33. By actuating the traction cable 34, the angle lever 35 is so moved that it pulls the rod 36 and thus the counter hook 23 upwards, wherein the upper coupling point 4 may slide back again. At the same time, the coupling hook 22 is pulled upwards. The upper coupling point 4 is thus

disengaged again. The lower links of the tractor may now be separated from the lower coupling points 5, 6, and may be correspondingly manoeuvred with the tractor. Then the tractor may be moved away from the rear mounted implement 2 until there is sufficient space between the rear mounted implement 2 and the tractor in order to remove the drive shaft from the PTO of the tractor and uncouple the supply lines. The rocker arm 10 is then no longer under tension and the upper link may be removed easily and simply from the upper coupling point 4.

Patentkrav

1. Påmonteringstårn (1) til hækmonteret redskab (2) såsom påmonteret sprøjte (3), der har et øvre koblingspunkt (4) og to nedre koblingspunkter (5, 6) til forbindelse med topstangen og trækstængerne af en traktors trepunktsophæng, hvor det øvre koblingspunkt (4) er arrangeret på en konstruktionsdel (9) og kan bevæges til en forreste koblingsposition (11) til forbindelse med topstangen og til en bageste arbejdsposition (12) til forbindelse med topstangen, der er forbundet med det øvre koblingspunkt (4), hvor konstruktionsdelen (9) og dermed også det øvre koblingspunkt (4) er udformet låsbart i arbejdspositionen (12) og variabelt bevægeligt i koblingspositionen (11),

kendetegnet ved,

at konstruktionsdelen (9) er udformet automatisk låsbart i arbejdspositionen (12) med et låsesystem (20), og låsesystemet (20) har føringselementer (21), der udformet til at forhindre en for tidlig låsning af det øvre koblingspunkt (4) under koblingsfasen, tillade en begrænset rangering af traktoren under koblingsfasen og først bevirke en låsning ved løftning af det hækmonterede redskab (2).

2. Påmonteringstårn til hækmonteret redskab ifølge krav 1,

kendetegnet ved,

at konstruktionsdelen (9) er udformet som svingarm (10), som kan svinges til en forreste koblingsposition (11) til forbindelse med topstangen og til en bageste arbejdsposition (12) til forbindelse med topstangen, der er forbundet med det øvre koblingspunkt (4), hvor svingarmen (10) og dermed også det øvre koblingspunkt (4) er udformet låsbart i arbejdspositionen (12) og variabelt bevægeligt i koblingspositionen (11).

3. Påmonteringstårn til hækmonteret redskab ifølge krav 1,

kendetegnet ved,

at traktorens trepunktsophæng har et lynkoblingssystem med fangkrog, f.eks. lynkoblingssystemet ifølge ISO-11001-3.

4. Påmonteringstårn til hækmonteret redskab ifølge krav 1 eller 2,
kendetegnet ved,
at svingarmen (10) er udformet automatisk låsbart i arbejdspositionen (12) med et låsesystem (20).

5. Påmonteringstårn til hækmonteret redskab ifølge krav 1,
kendetegnet ved,
at låsesystemet (20) og føringselementerne (21) består af en koblingskrog (22) med modhage (23), hvor koblingskrogens (22) bageste ende (30) er begrænset svingbart forbundet med påmonteringstårnet (1) via en tværaksel (24), og modhagen (23) er begrænset svingbart forbundet med koblingskrogens (22) forreste ende (31) omkring et tværled (25).

6. Påmonteringstårn til hækmonteret redskab ifølge krav 4,
kendetegnet ved,
at der er tilvejebragt en fjernstyring (33) til udkobling af låsesystemet (20), idet svingarmen (10) og det øvre koblingspunkt (4) er udformet til at kunne bringes fra arbejdspositionen (12) til koblingspositionen (11).

7. Påmonteringstårn til hækmonteret redskab ifølge krav 6,
kendetegnet ved,
at fjernstyringen (33) er udformet som trækline (34), som er kinematisk forbundet med koblingskrogen (22) via et koblingssled (29).

Drawings

Fig. 1

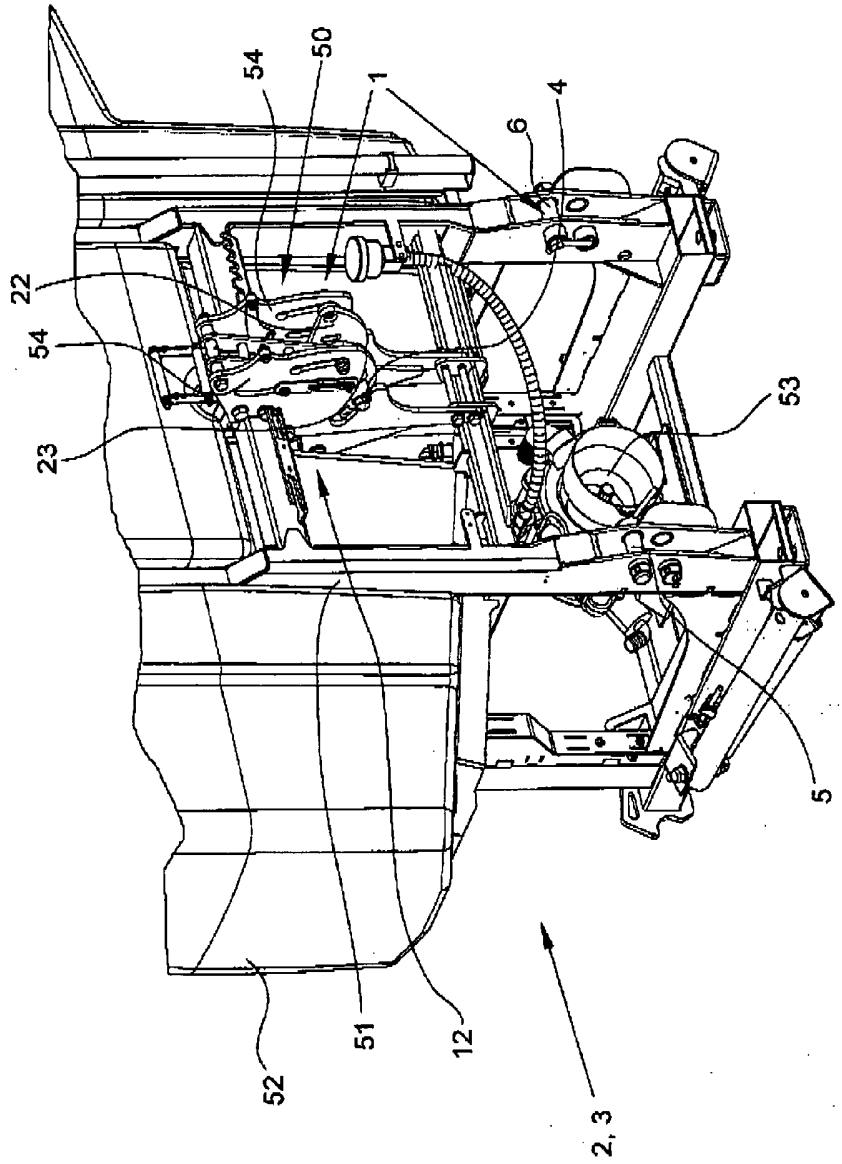

Fig. 2

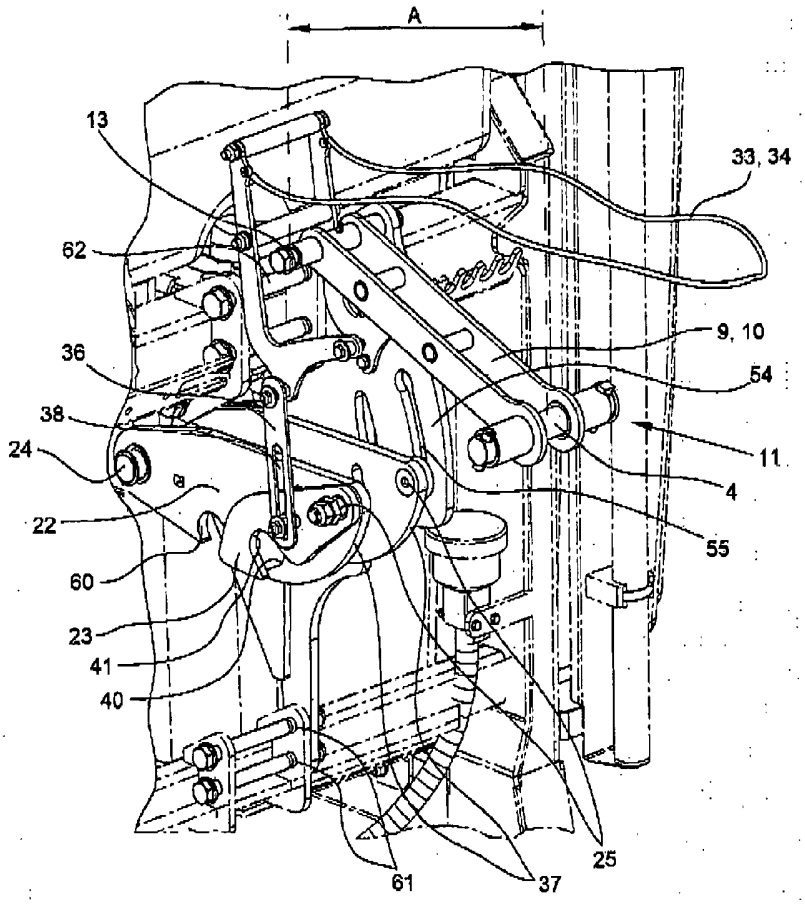

Fig. 3

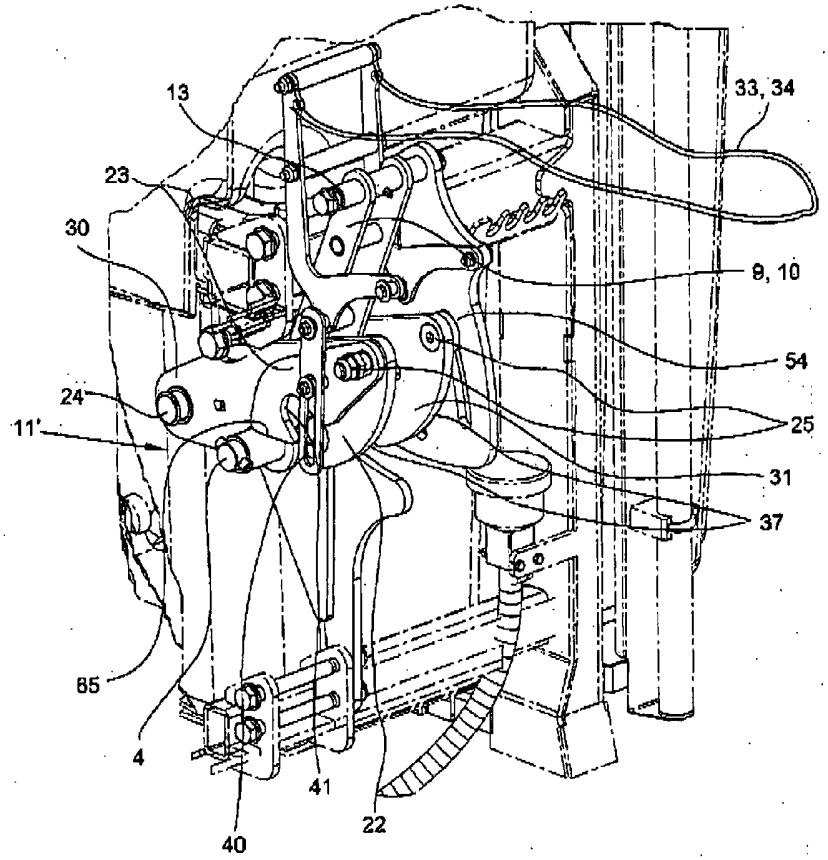

Fig. 4