

(19) **DANMARK**

(10) **DK/EP 3756435 T3**



(12)

Oversættelse af
europæisk patentskrift

Patent- og
Varemærkestyrelsen

-
- (51) Int.Cl.: **A 01 B 59/00 (2006.01)** **A 01 B 63/111 (2006.01)** **F 15 B 11/00 (2006.01)**
F 15 B 13/02 (2006.01)
- (45) Oversættelsen bekendtgjort den: **2023-07-03**
- (80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2023-06-07**
- (86) Europæisk ansøgning nr.: **20401033.4**
- (86) Europæisk indleveringsdag: **2020-05-19**
- (87) Den europæiske ansøgnings publiceringsdag: **2020-12-30**
- (30) Prioritet: **2019-06-25 DE 102019117081**
- (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**
- (73) Patenthaver: **Amazonen-Werke H. Dreyer SE & Co. KG, Am Amazonenwerk 9-13, 49205 Hasbergen, Tyskland**
- (72) Opfinder: **Hoffmann, Karl-Peter, Im Obstgarten 33, 27798 Hude, Tyskland**
- (74) Fuldmægtig i Danmark: **Novagraaf Brevets, Bâtiment O2, 2 rue Sarah Bernhardt CS90017, F-92665 Asnières-sur-Seine cedex, Frankrig**
- (54) Benævnelse: **ENHED TIL JUSTERING AF EN HYDRAULISK TOPSTANG**
- (56) Fremdragne publikationer:
EP-A1- 1 092 095
DE-A1- 19 747 949
DE-A1-102013 101 761
DE-A1-102015 103 925
NL-A- 7 003 615

DEVICE FOR ADJUSTING A HYDRAULIC TOP LINK

Description

The invention relates to a device for adjusting a hydraulic upper link according to the preamble of claim 1.

5 Such devices are disclosed in DE 10 2013 101761 A1 and EP 1 092 095 A1.

A further such device for adjusting a hydraulic upper link is described in DE 197 47 949 A1. This hydraulic upper link designed as a double-acting hydraulic cylinder comprises, on each chamber side, a hydraulic connection, which is connected in each case via a line section to a common shut-off unit, which has for each
10 hydraulic connection a check valve that can be released by means of a pressure controller. The connections of the line sections of the hydraulic cylinder are each connected to one of the two input connections of the shut-off unit connected to the releasable check valves. At another point of the shut-off unit, output connections
15 connected to the releasable check valve are arranged, to which hydraulic lines connected to a hydraulic system, having a control unit, of the traction vehicle which supports and/or pulls the agricultural machine, are connected.

By actuating the control unit of the hydraulic system of the towing vehicle which supporting and/or pulling the agricultural machine, the hydraulic upper link can be adjusted in its length by means of a corresponding switching of the control
20 unit by extending or retracting the piston rod of the upper link relative to the cylinder barrel of the upper link. The fixing of the length or the adjusting of the hydraulic upper link is carried out by switching the control unit into the locked position so that the length of the hydraulic upper link, additionally secured via the check valves of the shut-off unit, is reliably adjusted.

25 In some applications, it is desirable for the hydraulic upper link to be set in a so-called floating position so that, for the corresponding deployments, the upper link can change its length according to the active deployment situation the hydraulic upper link independently by means of the devices which the upper link connects

or couples to one another. However, the known upper link is not suitable for such applications because such a floating position cannot be realized here.

A hydraulic upper link with a position sensor is also disclosed in DE 10 2015 103 925 A1. NL 7 003 615 A discloses a hydraulic turning device for rotary ploughs
5 and DE 197 47 949 A1 discloses a device for adjusting the length of an upper link.

The object of the invention is to provide a simple convenient and safe switching of the hydraulic upper link to a floating position as simply and cost-effectively as possible.

This object is achieved according to the invention by the features of claim 1.

Advantageous embodiments of the invention are specified in the dependent claims.

10 As a result of these measures, it is possible to establish the desired floating position easily and safely when it is required. As a result of the easily producible floating position for the hydraulic upper link, the devices, which one another or coupled by means of said upper link, can move freely in relation to one another in order to be able to follow, for example, an uneven or hilly ground surface. If
15 necessary, the locked position of the hydraulic upper link can be activated again very easily so that the floating position is canceled.

In order to be able to easily bring the hydraulic upper link into a floating position or locked position, it is provided that the two 2/2-way valves each have a locked position and a flow position which creates a floating position of the upper link, in that the 2/2-
20 way valves are connected by means of a common control line and can be switched via this control line into the locked position or the flow position. The 2/2-way valves, which have electrically actuatable switching elements, are to be switched into the position required for the respective position via the control line. For example, the locking function of the control block can be easily bridged by the electrically
25 actuatable switching elements of the control valve via the bypass line. In addition, the control unit of the hydraulic system of the towing vehicle which supports and/or pulls the agricultural machine must be brought into floating position in order to produce the floating position of the hydraulic upper link. If the electrically actuatable switching elements of the control valve are deactivated via the control line, the locking function

of the control block is immediately active again and the hydraulic upper link is closed in its set position and its length can no longer be changed.

In order to ensure that a secure connection is always provided between the shut-off unit with the releasable check valve and the connections of the hydraulic upper link, it is provided that the two first hydraulic lines between the shut-off unit and the upper link configured as a double-acting hydraulic cylinder are configured as line pipes consisting of metal.

In one embodiment, if the hydraulic system is the hydraulic system, having at least one control unit, of the towing vehicle which supports and/or pulls the agricultural machine, it is provided that the length of the upper link can be adjusted and/or the floating position established via the control device. As a result, the respectively desired adjustment of the hydraulic upper link in connection center of the above-mentioned electronic control line and the directional valves which can be actuated hereby can be realized very easily.

Further details of the invention can be found in the description of examples and in the drawings. In the drawings:

Fig. 1 shows the hydraulic upper link in plan view,

Fig. 2 shows the hydraulic upper link in section II-II and

Fig. 3 shows a simplified view of the circuit diagram for the hydraulically actuatable hydraulic cylinder with the control device of the hydraulic system of the towing vehicle which supports and/or pulls the agricultural machine.

The hydraulic upper link 1 comprises the piston rod 3 arranged in a cylinder barrel 2. The piston rod 3 projects out of one end 4 of the cylinder barrel 2. A first connection lug 6 is arranged on the end 5 of the piston rod 3 protruding from the cylinder barrel 2. A second connection lug 8 is arranged on the cylinder barrel 2 on the side 7 of the cylinder barrel 2 opposite the first connection lug 6. A piston 10 having sealing elements opposite the inner surfaces of the cylinder barrel 2 is arranged on the end 9 of the piston rod 3 protruding into the cylinder barrel 2. Connections 11.1 and 12.1,

which are connected to the interior of the cylinder tube 2, are arranged in the respective end regions of the cylinder tube 2. Said connections 11.1 and 12.1 are connected via two first hydraulic lines 11.2 and 12.2 to the two input connections 11.3 and 12.3 of a shut-off unit 13. Said hydraulic lines 11.2 and 12.2, which are arranged
5 between the upper link 1 configured as a double-acting hydraulic cylinder, are designed as line pipes made of metal. Furthermore, the shut-off unit 13 has two output connections 11.4 and 12.4, which are connected via hydraulic lines 11.5 and 12.5 to the hydraulic system, having a control device 14, of a traction vehicle which carries and/or pulls an agricultural machine.

10 A releasable check valve 15 or 16 is arranged in each case in the connecting line 11.6 and 12.6 connecting the opposite input 11.3 and 12.3 and output connections 11.4 and 12.4 of the shut-off unit 13. Thus, the shut-off unit 13 comprises two releasable check valves 15 and 16.

In the shut-off unit 13 with the two releasable check valves 15 and 16, two 2/2-
15 way valves 17 and 18 are also arranged in an integrated manner. A bypass line 11.7 or 12.7 that bypasses the respective check valve 15 or 16 is associated with each of these releasable check valves 15 and 16. The respective bypass line 11.7 or 12.7 is correspondingly connected to the connecting line 11.6 or 12.6 that connects the respective opposite input 11.3 or 12.3 and output connections 11.4
20 or 12.4 of the shut-off unit 13, in order to bypass the associated releasable check valve 15 or 16. In each of these connecting lines 11.6 or 12.6, a 2/2-way valve 17 or 18 can be actuated by means of a motorized actuating element 17.1 or 18.1 in a connecting line 11.6 or 12.6 connecting the opposite input 11.3 or 12.3 and output connections 11.4 or 12.4 of the shut-off unit 13.

25 The respective motorized actuating element 17.1 or 18.1 of the respective 2/2-way valve 17 or 18 is connected to a common control line 19. A manually actuatable switch 20 is associated with this control line 19. A current source 21 is associated with the control line 19.

Each of the 2/2-way valves 17 and 18 has two possible switching positions 17.2 17.3
30 or 18.2 and 18.3, wherein the one switching position is designed as a flow position

17.3 or 18.3, while the other switching position is configured as a locked position 17.2 or 18.2. Thus, the two 2/2-way valves 17 and 18 each have a locked position 17.2 or 18.2 and a flow position 17.3 or 18.3 that creates a floating position of the upper link 1. As already mentioned, the two 2/2-way valves 17 and 18 are connected by means
5 of a common control line 19 which comprises the switch 20. The 2/2-way valves 17 or 18 can be switched via said control line 19 with the switch 20 into the locked position 17.2 or 18.2 or the flow position 17.3 or 18.3 in order to selectively fix the hydraulic upper link 1 into the set position or to enable a free change.

Thus, as already mentioned, the two 2/2-way valves 17 and 18 are each
10 simultaneously to be switched into a locked position or a flow position that creates a floating position of the upper link 1. This occurs in that the 2/2-way valves 17 and 18 are connected by means of a common control line and are simultaneously switched via this control line 19 into the locked position or the flow position. As a result, the length of the hydraulic upper link 1 can be adjusted by means of the
15 aforementioned directional valves in combination with the control device 14 of the hydraulic system in conjunction with the releasable check valves 15 and 16 and the 2/2-way valves 17 and 18 that can be controlled via the control line 19 and the associated motorized adjusting means 17.1 and 18.1 via the control line 19, or the floating position for the hydraulic upper link 1 can be produced.

20 The control device 14 of the hydraulic system of the towing vehicle, which carries and/or pulls the agricultural machine, has at least one switching valve 14A which at least one switching position for a locked position 14A.1, a floating position 14A.2 and two active positions 14A.3 and 14A.4 for the retraction and extension of the piston rod 3 of the hydraulic upper link 1.

25 The mode of operation of the above-described device for adjusting a hydraulic upper link 1 of an attachment of an agricultural machine having a shut-off unit 13 arranged on the upper link 1, which shut-off unit is connected via two first hydraulic lines 11.2 and 12.2 to the upper link 1 configured as a double-acting hydraulic cylinder and via two further hydraulic lines 11.5 and 12.5.5 to a hydraulic system,
30 and is equipped with check valves 15 and 16 via switchable directional valves 17 and 18 having bypassable via bypass lines 11.7 and 12.7, is as follows:

In the basic position, as shown in the circuit diagram according to Figure 3, the switching valve 14A of the control unit 14 is positioned so that the locked position 14 A.1 is active. At the same time, the releasable check valves 15 and 16 close the connecting line 11.6 and 12.6; the bypass lines 11.7 and 12.7 are also closed by the switching positions 17.2 and 18.2 of the directional valves 17 and 18, respectively. Thus, the piston rod 3 of the upper link 1 is securely fixed and set in the set position. In this setting, the position and thus the length of the upper link is held in this position. As a result of the solid brutalization through the lines 11.2 and 12.2, the risk of physical damage to people is minimized to the lowest possible risk.

10 If the hydraulic upper link 1 is to be extended by extending the piston rod 3, the switching valve 14A is brought into the active switching position 14A.4 by actuating said switching valve 14A. As a result, the releasable check valve 16 is released the via a pressure control, hydraulic oil is pressed via the line 11.5 out of the hydraulic system via the check valve 15, the connecting line 11.6 and 11.2 into the cylinder chamber of the hydraulic upper link 1. As a result, the piston rod 3 is extended and the upper link 1 is extended. At the same time, hydraulic oil is pushed back out of the cylinder chamber, in which the piston rod 3 is located, via the line 12.2 and 12.6 and the releasable check valve 16, into the hydraulic line 12.5 and thus into the hydraulic system. When the corresponding length of the upper link 1 is adjusted, the switching valve 14 A is brought back into the locked position 14 A.1.

If the hydraulic upper link 1 is to be shortened by retracting the piston rod 3, the latter is brought into the active switching position 14 A.3 by actuating the switching valve 14 A. As a result, the releasable check valve 15 is released the via a pressure control, hydraulic oil is pressed via the line 12.5 out of the hydraulic system via the check valve 15, the connecting line 12.6 and 12.2 into the cylinder chamber of the hydraulic upper link 1. As a result, the piston rod 3 is retracted and the upper link 1 is shortened. At the same time, hydraulic oil is pushed back out of the cylinder chamber, in which the piston is located, via the line 11.2 and 11.6 and the releasable check valve 15, into the hydraulic line 11.5 and thus into the hydraulic system. When the corresponding length of the upper link 1 is adjusted, the switching valve 14 A is brought back into the locked position 14 A.1.

In order now to easily adjust the floating position of the hydraulic upper link according to the invention when it is required, the switch 20 is first actuated by the driver of the towing vehicle which supports and/or pulls the agricultural machine, so that said switch 20 is closed. The motorized actuating elements 17.1 and 18.1
5 configured as magnets are supplied with current, since they are now connected to the current source 21. As a result, the 2/2-way valves 17 and 18 are switched at the same time, so that the switching position 17.3 or 18.3 forming the throughflow position closes the respective bypass line 11.7 and 12.7, so that the check valves 15 and 16 are bypassed via this. Subsequently, the switching valve 14A of the
10 tractor control unit 14 is brought into the floating position 14A.2 by the driver of the towing vehicle which supports and/or pulls the agricultural machine. After this, the hydraulic upper link 1 is in the floating position. The upper link 1 can adopt its length freely depending on the requirement of the deployment.

In order to cancel or switch off the floating position of the hydraulic upper link 1, the
15 switch 20 need only be brought into its open position session again by the driver of the towing vehicle which supports and/or pulls the agricultural machine, so that the current source 21 is disconnected from the control line 19 so that the motorized actuating elements 18.1, configured preferably as switching magnets, switch the respective 2/2-way valves 17 and 18 simultaneously and bring them back into the
20 locked position 17.2 or 18.2, so that the hydraulic cylinder is immediately fixed in its position and locked. Thus, the shut-off unit is again active immediately after switching off and the safety function is immediately rendered without limitation.

The advantages of this circuit according to the invention are as follows:

- Two steps must be produced for the adjustment of the floating position for
25 the hydraulic upper link 1 in that the manually operated switch 20 for the control line 19 and the switching valve 14A of the tractor control unit 14 have to be actuated in each case.
- In order to cancel the floating position for restoring the normal position of the hydraulic upper link 1 (the upper link is fixed and blocked in its length) only one
30 step is required, namely the switch 20 for the opening thereof and interruption of

the power supply to the actuating elements 17.1 and 18.1 of the directional valve 17 or 18. Thus, the hydraulic upper link 1 is immediately blocked even if the shut-off valve 14A of the tractor control unit 14 is still in floating position 14A.2.

5 Finally, it should not go unmentioned that an extremely compact configuration of the shut-off unit and/or control block 13, in that both the releasable check valves 15 and 16 of the actual shut-off unit as well as the bridging valves configured as 2/2-way valves 17 or 18 are arranged in the said shut-off unit and/or control block 13 in an integrated manner. As a result of this compact configuration, this can thus be installed or fastened directly on the hydraulic upper link 1. This fastening and installation can
10 take place by means of solid piping consisting of metal pipes. To this extent, said piping can also be the fastening of the shut-off unit and/or control block 13 on the upper link 1 at the same time, so that no further fastening means are required.

PATENTKRAV

1 Et apparat til justering af en hydraulisk topstang (1), udformet som en dobbeltvirkende hydraulisk cylinder på en landbrugsmaskines monteringsanordning,

5 apparatet omfatter en afspærringsblok (13), der kan anbringes på topstangen (1), to første hydraulikslanger (11.2, 12.2), yderligere to hydraulikslanger (11.5, 12.5) og en styrepult (13),

afspærringsblokken (13) er konfigureret til at blive forbundet med topstangen (1) via de to første hydraulikslanger (11.2, 12.2) og til et hydraulisk system via de to yderligere hydraulikslanger (11.5, 12.5),

10

afspærringsblokken (13) har to udløselige kontraventiler (15, 16), som hver er anbragt mellem en af de første hydraulikslanger (11.2, 12.2) og en af de yderligere hydraulikslanger (11.5, 12.5), **kendetegnet ved**, at afspærringsblokken (13), der omfatter de to udløselige kontraventiler (15, 16), er anbragt integreret i styrepulten (13), der indeholder to 2/2-vejsventiler (17, 18), **idet en** 2/2-vejsventil (17, 18) er tilknyttet hver udløselig kontraventil (15, 16), og **ved at** den relevante 2/2-vejsventil (17, 18) er anbragt i en omløbsslange (11.7, 12.7), der omgår den tilhørende udløselige kontraventil (15, 16), idet omløbsslangerne (11.7, 12.7) er anbragt i afspærringsblokken (13).

15

20 2. Apparatet er i henhold til krav 1, **kendetegnet ved**, at de to 2/2-vejsventiler (17, 18) hver har en afspærringsposition (17.2, 18.2) og en gennemstrømningsposition, der danner en flydeposition (17.3, 18.3) på topstangen (1), og **ved at** 2/2-vejsventilerne (17, 18) er forbundet ved hjælp af en fælles styreledning (19) og kan kobles via denne styreledning (19) i lukket position (17.2, 18.2) eller gennemstrømningsposition (17.3, 18.3), idet styreledningen (19) er en del af apparatet.

25

3. Apparatet er i henhold til mindst ét af de foregående krav, **kendetegnet ved**, at de to første hydraulikslanger (11.2, 12.2) er udformet mellem låseblokken (13) og topstangen (1), designet som en dobbeltvirkende hydraulisk cylinder, da rørledninger består af metal.

30

4. Apparatet omfatter i henhold til mindst et af de foregående krav, hvor det hydrauliske system er det hydrauliske system, mindst én styreenhed (14), af trækkøretøjet, som bærer og/eller trækker landbrugsmaskinen, idet apparatet omfatter styreenheden (14), **kendetegnet ved**, at topstangens (1) længde ved
- 5 hjælp af styreenheden (14) kan justeres, og/eller flydepositionen kan frembringes.

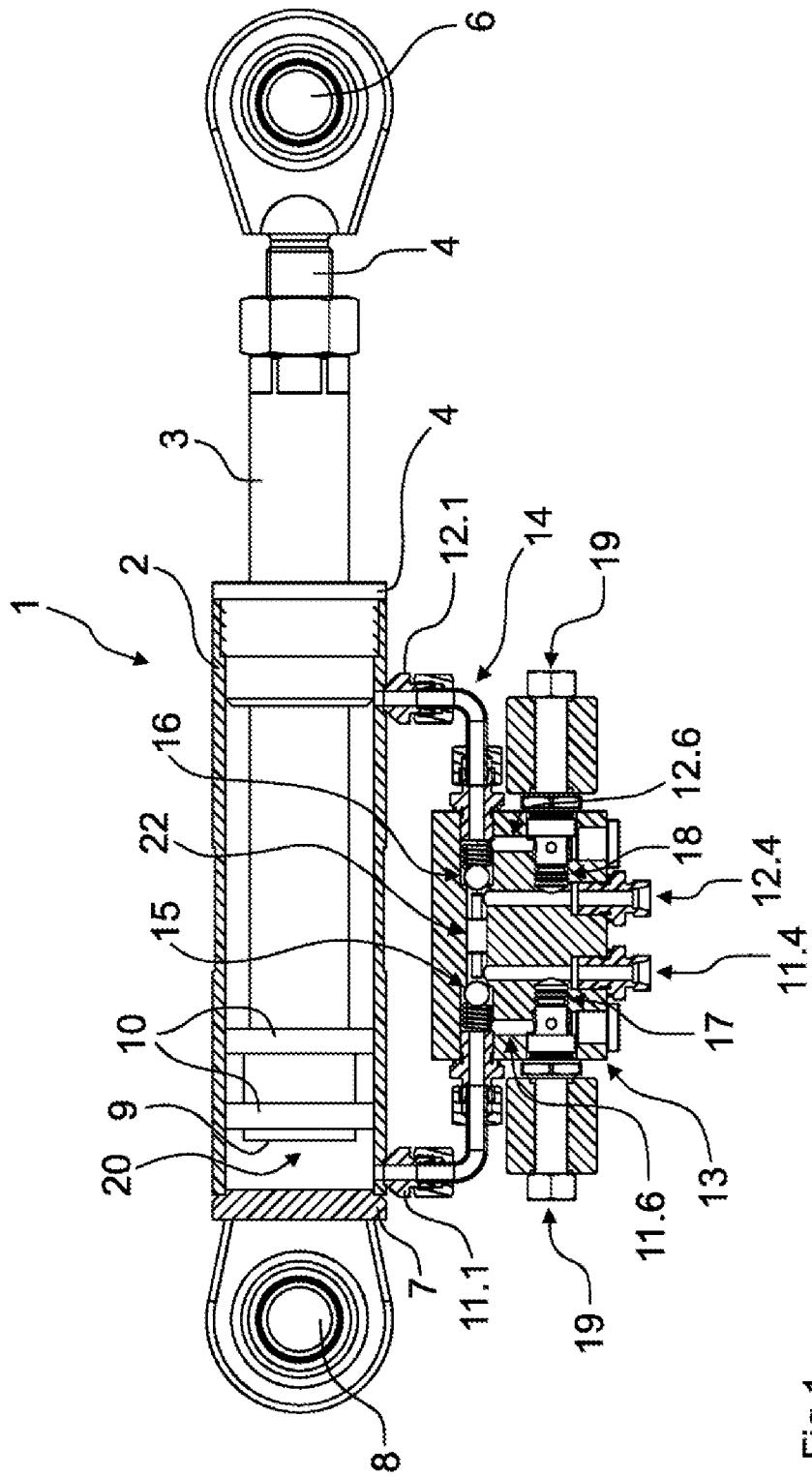


Fig.1

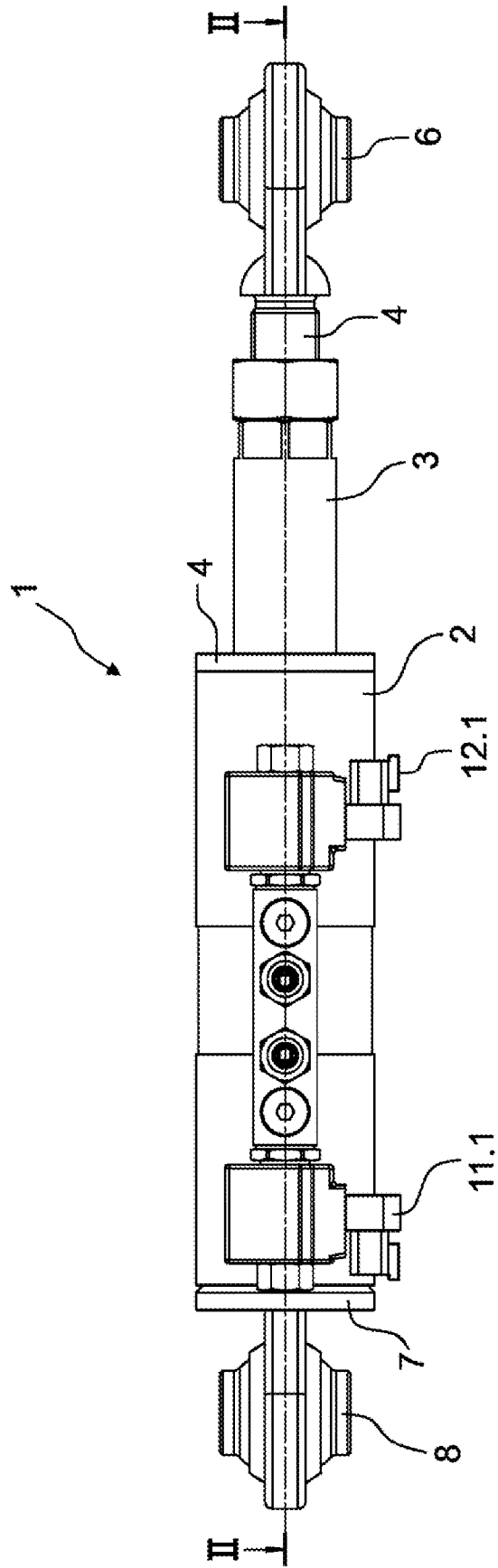


Fig.2

