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(54) **LINK MEMBER BETWEEN A ROTATIONAL IMPLEMENT OR SIMILAR WORKING TOOL AND A HYDRAULIC CRANE ARM**

VERBINDUNGSELEMENT ZWISCHEN EINER DREHVORRICHTUNG ODER ÄHNLICHEM WERKZEUG UND EINEM HYDRAULISCHEN KRANARM

ÉLÉMENT DE LIAISON ENTRE UN OUTIL ROTATIF OU INSTRUMENT DE TRAVAIL SEMBLABLE ET UN BRAS DE GRUE HYDRAULIQUE

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EP 2 931 646 B1

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Description

[0001] The present invention refers to a link member between a rotational implement or a similar working tool and a hydraulic crane arm, in particular for cranes suitable for mounting onto motor vehicles.

[0002] Such inventions belong to the field of transporting and performing working operations, in particular to cranes, namely to crane arms and gripping devices in view of transmission of lifting forces.

[0003] The aim of the invention is to create a link member of a rotatable gripping device or similar working tool on the hydraulic crane arm, in particular for cranes mounted onto motor vehicles, which should increase reliability in long-term operation of such crane.

[0004] A crane arm with a link member for attaching a working accessory is described in EP 1 889 808, wherein a rotatable working accessory, in particular a gripping device suitable for gripping and displacing of timbers or similar at least approximately cylindrical objects is attached to such crane arm via the link member. Such link member comprises two pivot joints, which are spaced apart from each other in a direction of the vertical axis. Said pivot joints are located on the side of the crane arm as well as on the side of the rotator for the purposes of functioning as a Cardan pivot joint. Both rotation axis, around which pivoting is allowed, are arranged perpendicularly with respect to each other. Hydraulic conduits preferably extend along the interior of the crane arm and are directed from the crane arm towards at least approximately horizontally arranged hydraulic connectors on the crane-faced side of rotator which is arranged between said gripping device or working accessory and that side of the link member, which is faced towards said gripping device. The pivot joint of the link member, which is facing towards the crane arm, comprises two coaxially arranged bearings, which enable rotating, and hydraulic conduits are directed between said bearings towards said hydraulic conduits on said rotator, but outside of that pivot joint of the link member, which is faced towards the rotator. The main benefits of such arrangement, where the hydraulic conduits are directed towards the rotation axis and towards the gripping device or the working accessory, however passing the rotation axis at certain distance apart from it, wherein the hydraulic connectors are arranged on the crane-faced side of the link member, result in the fact that hydraulic conduits are more efficiently protected against external impacts during operation of the crane, while at the same time also undisturbed movement and rotating of the gripping device or similar working accessory is enabled. On the contrary, such concept is also connected with serious deficiencies resulting mainly from the concept of the pivot joint, which is faced towards the crane arm and is furnished with two spaced bearings, between which the hydraulic conduits are arranged. Said hydraulic conduits are usually four relatively thick flexible hydraulic hoses, which are due to unhindered movement during operation of the crane loosely placed between

said bearings. Due to maneuvering capability of the crane as such and due to preventing the crane from hooking to object in the circumference thereof, said pivot joint as such should be as narrow as possible, but on the contrary, said hydraulic conduits require as much as possible space between said bearing for the purposes of unhindered movement thereof. A compromise between said contradictions leads to quite narrow bearings, and of this reason ball bearings are usually used. Roller bearings and needle bearings are wider and much more expensive, and also lead to undesired enlargement of the width of the pivot joint. Unfortunately, the ball bearings are then not rotated with appropriately high velocity, which would enable establishing of required lubricating conditions. On the contrary, such bearing is used for just occasionally pivoting, where the deflections from the original position i.e. the vertical plane are usually ± 15 to 45 degrees, and actual loading of the bearings during the practical exploitation of the crane is extremely inappropriate, by which also a desired lubricating is practically impossible to be achieved. A complete loading is transferred via two or three roller members within each bearing, and practically all the time via the same ones, so that the lubricant is removed from the area of these roller member in a very short time, which is still assisted by hot hydraulic conduits arranged in the adjacency thereof. Of that reason, such concept of the link member in particular by extensively used cranes leads to repeating defects, which make further exploitation of the crane impossible, until the bearings are replaced in the service station.

[0005] A further approach is described in WO 2011/142704, where also a link member is described, via which the hydraulic rotator is connected with the crane arm. Hydraulic conduits are directed along the interior of the crane arm towards the hydraulic connectors on the rotator. The member link comprises two pivot joints, namely a bifurcated i.e. double upper pivot joint arranged on the side of the crane arm and a single pivot joint arranged on the side of the rotator, wherein both axis of said pivot joints, around which pivoting is possible, are arranged perpendicularly with respect to each other. In order to achieve better guidance of the hydraulic conduits, the link member is furnished with a pin, which is inserted throughout both protrusions of the upper pivot joint and through both bearings, so that the geometric axis of said pin is aligned with the geometric axis of the pivot joint as such, wherein a separate guide for hydraulic circuits is arranged on said pin. Said guide is formed of an U-shaped plate, and both arms thereof are furnished with throughout openings, through which said pin is inserted. Hydraulic conduits are directed from the interior of the crane arm over said pin, more exactly between said pin and said guide, and then towards the hydraulic connectors on the rotator. Thanks to said guide, some better guidance of the hydraulic conduits is achieved, which leads to more reliable operation of the crane, but the problem of inappropriate loading and lubricating of the bearings in the pivot joint remains completely un-

solved.

[0006] The present invention refers to a link member between a rotational implement or a similar working tool and a hydraulic crane arm, namely a link member, which is on the one hand pivotally connected with said crane arm and on the other hand also pivotally with a hydraulic rotator, which is connectable with each used working accessory or gripping device. Such link member comprises two pivot joints, which are located at appropriate distance apart from each other in a direction of vertical axis, namely an upper pivot joint located on the side of the crane arm and a lower pivot joint located on the side of the rotator or each working accessory, so that said pivot joints are conceived as a Cardan pivot link with two rotation axis, which allow pivoting of the link member relative to the crane arm and/or relative to the rotator and which extend perpendicularly with respect to each other. The lower pivot joint intended for pivotal interconnection of the link member with the rotator is conceived in form of an eye, which is furnished with a throughout bore, which is directed along said rotational axis of the lower pivot joint and is adapted to receive a bolt, while the upper pivot joint, which is located on the side of the crane arm and adapted for establishing a pivotal interconnection therewith, is bifurcated and comprises two protrusions, which are spaced apart from each other and are each per se furnished with a throughout bore adapted to receive a bolt serving for establishing interconnection with the crane arm, and wherein hydraulic conduits, which extend between the crane arm and the rotator, are directed between said extensions of the upper pivot joint of the link member.

[0007] In accordance with the invention, a hollow cylindrical bush is inserted through the bores in the protrusions on the upper pivot joint of the link member on the side of the crane arm, and two bearing bushes are inserted, preferably pressed, therein and are each per se located on corresponding end portion thereof, so that the bolt, which is intended for establishing a pivotal interconnection between the link member and the crane arm in the area of the upper pivot joint of the link member, is inserted through them.

[0008] In a preferred embodiment of the invention, the protrusions of the upper pivot joint are extended towards the crane arm and are at appropriate distance apart from the bush bridged by a limitation means, while simultaneously the hydraulic conduits are directed from the crane arm towards the link member and then towards to the rotator in such manner that in the area of the upper pivot joint of the link member they extend between the bush and the limitation means towards hydraulic connectors on the rotator.

[0009] Said limitation means is preferably cylindrical and extends parallel to said rotation axis of the upper pivot joint of the link member, and is in particular conceived as a pin extending throughout said protrusions and between them.

[0010] The limitation means is located at a pre-deter-

mined distance apart from the bush of the upper pivot joint as well as at a pre-determined distance apart from the vertical axis of the link member, which is defined by angle between a tangent to the limitation means on the side of said vertical axis and the vertical axis itself. In this, the distance between the limitation means and the bush is preferably 35 - 55 mm, and the angle between a tangent to the limitation means on the side of the vertical axis and said vertical axis itself is preferably 10 - 30°. Besides, a roller member can be placed around said limitation means.

[0011] Moreover, at least one lubricating device adapted for transferring lubricant towards the areas between the bearing bushes and the bolt is foreseen on the bush and/on the bolt, which is mounted on the upper pivot joint (on the side of the crane arm).

[0012] The invention will be described in detail by means of an embodiment, which is presented in the enclosed drawings, wherein

- Fig. 1 is an isometric front view of a link member according to the invention in its mounted state;
 Fig. 2 is a front isometric view of a link member according to the invention in its mounted state;
 Fig. 3 is an explosion isometric view of a separately presented link member according to the invention; and
 Fig. 4 is a side isometric view of a separately presented link member according to the invention.

[0013] A crane arm 2 with a member link 1 is partially shown in Fig. 1, by means of which at a not-shown, at least partially rotatable working accessory, in particular a gripping mechanism adapted for lifting and displacing of timbers or similar approximately cylindrical objects, is attached to said crane arm 2.

[0014] Said link member 1 comprises two pivot joints 11, 12, which are located apart from each other in direction of the vertical axis, namely an upper pivot joint 11, which is located on the side of the crane arm 2, as well as a lower pivot joint 12, which is located on the side of a rotator 3 i.e. a working accessory.

[0015] Said pivot joints 11, 12 on the side of the crane arm 2 and the rotator 3 are conceived to function as a Cardan pivot joint. Rotation axis 110, 120 of both pivot joints 11, 12 allowing pivoting, extend perpendicularly with respect to each other.

[0016] The lower pivot joint 12 is conceived as an eye 121 with a throughout bore 122 extending along said rotation axis 120 of the lower pivot joint 12.

[0017] Between each disposable working accessory and the link member 1 a rotation unit is included, a so-called rotator 3, consisting of a stationary portion 3', which is connectable with said link member 1 and is furnished with hydraulic connectors 31, 32, 33, 34, as well as of a rotatable portion 3'', to which said working accessory is connectable. Said stationary portion 3' of the rotator 3 is furnished with two eyes 35, 36, which are located at ap-

appropriate distance apart from each other and are each per se furnished with a throughout bore 35', 36', so that the lower pivot joint 12 of the link member 1 is inserted between them, wherein the pivotal interconnection between the rotator 3 and the link member 1 is established by means of a bolt 37, which is inserted within said bores 35', 36' on the eyes 35, 36 of the stationary portion 3' of the rotator 3 and at the same time also within a bore 122 on the eye 121 of the lower pivot joint 12 of the link member 1.

[0018] Three hydraulic conduits 41, 42, 43 are presented in the drawings, although in general e.g. four conduits can be placed within the crane arm 2, and extend from said crane arm 2 towards each corresponding hydraulic connectors 31, 32, 33 on the stationary portion 3' of the rotator 3, which are directed horizontally towards the crane arm 2.

[0019] The upper pivot joint 11 on the side of the crane arm 2 is bifurcated i.e. fork-like shaped and comprises two protrusions 111, 112, which are each per se furnished with a throughout bore 111', 112'.

[0020] Said bores 111', 112' of said protrusions 111, 112 extend coaxially along said rotation axis 110 of said upper pivot joint 110.

[0021] A hollow cylindrical bush 113 is inserted through said bores 111', 112' of said protrusions 111, 112, into the interior of which two slide bearing bushes 114', 114" are tightly pressed on both end portions 113', 113" thereof in order to form a slide bearing, through which a bolt 13 is inserted, which serves as a complementary bearing element and which is generally used for the purposes of connecting the link 1 member with the crane arm 2 in the area of the upper pivot joint 11 of said link member 1. At least one lubricating device, which is not shown in the drawings, can be foreseen on said bush 113 of the upper pivot joint 11, or optionally on said bolt 13, which then serves for the purposes of transferring each lubricant towards both contact surfaces between said bearing bushes 114', 114" and the bolt 13.

[0022] Those skilled in the art shall understand that said bearing bushes 114', 114" consist of appropriate material with respect to sliding and lubricating properties not only for the purposes of lubricating bushes 114', 114" during rotation relative to the bolt 13 with sufficient velocity to form a so-called lubricating wedge, but also in some different circumstances, when said bushes 114', 114" are just occasionally pivoted around the bolt 13 at relative small angle in the range of approximately ± 15 to 45 degrees relative to the vertical axis. The compression stresses on contact surfaces between said bushes 114', 114" can in particular by lifting of heavier loads be pretty high, but can also be lowered by means of enlarging the length of said bushes 114', 114", which are however inserted within said bush 113 and such measure then has no impact to situation in the exterior of said bush 113.

[0023] For the purposes of guiding said hydraulic conduits 41, 42, 43 in the area of said link member 1, said

protrusions 111, 112 of the upper pivot joint 11 are extended towards the crane arm 2 and bridged with a limitation means 14 located at appropriate distance apart from said bush 113 i.e. rotation axis 110 of the upper pivot joint 11.

[0024] Said limitation means 14 is preferably cylindrically shaped and extends parallel with respect to said rotation axis 110 of the upper pivot joint 11 of the link member 1. The limitation means 14 can be conceived as a pin, which extends throughout said protrusions 111, 112 and between them.

[0025] Said limitation means 14 is used for the purposes of guiding the hydraulic conduits 41, 42, 43 in the sense of appropriate alignment and uniformly bending thereof despite to movement of the rotator 3 towards the crane arm 2 or away from it, and simultaneously for the purposes of preventing said hydraulic conduits 41, 42, 43 from extremely bending and/or disorder. To this aim, the invention provides for a pre-determined arrangement of said limitation means 14, which is defined by means of appropriate distance a apart from the bush 113 of the upper pivot joint 11 as well as by means of appropriate distance apart from the vertical axis of the link member 1, which is defined by means of an angle φ between a tangent t to said limitation means 14 on the side of said vertical axis and the vertical axis as such. Said distance a between the limitation means 14 and the bush 113 is 35 - 55 mm, and the angle φ between the tangent t to the limitation means 14 and the vertical axis is 10 - 30°.

A not shown roller member can be optionally placed around said limitation member 14, although the presence thereof is not required in view of realization of the invention as such.

[0026] Said hydraulic circuits 41, 42, 43 extend from the crane arm 2 towards to the link member 1, wherein in the area of the upper pivot joint 11 they are located between the bush 113 and the limitation means 14, and further extend towards the hydraulic connectors 31, 32, 33 on the rotator 3.

Claims

1. Link member (1) between a rotational implement or a similar working tool and a hydraulic crane arm (2), namely a link member (1), which is on the one hand pivotally connectable with said crane arm (2) and on the other hand also pivotally with a hydraulic rotator (3), which is connectable with each used working accessory or gripping device, wherein said link member (1) comprises two pivot joints (11, 12), which are located at appropriate distance apart from each other in a direction of the longitudinal axis of the link member (1), namely an upper side of the link member pivot joint (11) located on the crane arm (2) side of the link member (1) and a lower pivot joint (12) located on the rotator (3) side of the link member (1) or each working accessory, so that said pivot joints

(11, 12) are conceived as a Cardan pivot link with two rotation axis (110, 120), which allow pivoting of the link member (1) relative to the crane arm (2) and/or relative to the rotator (3) and which extend perpendicularly with respect to each other, and wherein the lower pivot joint (12) for pivotal interconnection of the link member (1) with the rotator (3) is conceived in form of an eye (121), which is furnished with a throughout bore (122), which is directed along said rotational axis (120) of the lower pivot joint (12) and is adapted to receive a bolt (37), while the upper pivot joint (11), which is located on the the crane arm (2) side of the link member (1) and adapted for establishing a pivotal interconnection therewith, is bifurcated and comprises two protrusions (111, 112), which are spaced apart from each other and are each per se furnished with a throughout bore (111', 112') adapted to receive a bolt (13) serving for establishing interconnection with the crane arm (2), and wherein hydraulic conduits (41, 42, 43), which extend between the crane arm (2) and the rotator (3), are directed between said protrusions (111, 112) of the upper pivot joint (11) of the link member (1), **characterized in that** a hollow cylindrical bush (113) is inserted through the bores (111', 112') in the protrusions (111, 112) on the upper pivot joint (11) of the link member (1) on the crane arm (2) side of the link member, and two bearing bushes (114', 114") are inserted therein and are each per se located on corresponding end portion (113', 113") thereof, so that the bolt (13), which is intended for establishing a pivotal interconnection between the link member (1) and the crane arm (2) in the area of the upper pivot joint (11) of the link member (1), is inserted through them.

2. Link member according to Claim 1, **characterized in that** the protrusions (111, 112) of the upper pivot joint (11) are extended towards the crane arm (2) and are at appropriate distance apart from the bush (113) bridged by a limitation means (14), **and in that** the hydraulic conduits (41, 42, 43) are directed from the crane arm (2) towards the link member (1) and then towards to the rotator (3) in such manner that in the area of the upper pivot joint (11) of the link member (1) they extend between the bush (113) and the limitation means (14) towards hydraulic connectors (31, 32, 33) on the rotator (3).
3. Link member according to Claim 2, **characterized in that** the limitation means (14) is cylindrical and extends parallel to said rotation axis (110) of the upper pivot joint (11) of the link member (1).
4. Link member according to Claim 3, **characterized in that** the limitation means (14) is conceived as a pin extending throughout said protrusions (111, 112) and between them.

5. Link member according to Claim 2 or 3, **characterized in that** the limitation means (14) is located at a pre-determined distance (a) apart from the bush (113) of the upper pivot joint (11) as well as at a pre-determined distance apart from the vertical axis of the link member (1), which is defined by angle (φ) between a tangent (t) to the limitation means (14) on the side of said vertical axis and the vertical axis itself.
6. Link member according to Claim 5, **characterized in that** the distance (a) between the limitation means (14) and the bush (113) is 35 - 55 mm, and the angle (φ) between a tangent (t) to the limitation means (14) on the side of the vertical axis and said vertical axis itself is 10 - 30°.
7. Link member according to anyone of Claims 3 to 6, **characterized in that** a roller member is arranged around the limitation means (14).
8. Link member according to anyone of Claims 1 to 7, **characterized in that** the at least one lubricating device adapted for transferring lubricant towards the areas between the bearing bushes (114', 114") and the bolt (13) is foreseen on the bush (113), which is mounted on the upper pivot joint (11) on the crane arm (2) side of the link member (1).
9. Link member according to anyone of Claims 1 to 7, **characterized in that** at least one lubricating device adapted for transferring lubricant towards the areas between the bearing bushes (114', 114") and the bolt (13) is foreseen on the bolt (13), which is mounted on the upper pivot joint (11) on the crane arm (2) side of the link member (1).
10. Link member according to anyone of the preceding Claims, **characterized in that** the bearing bushes (114', 114") are pressed into the bush (113).

Patentansprüche

1. Gelenkelement (1) zwischen einem drehbaren Arbeitsmittel oder einem ähnlichen Bearbeitungswerkzeug und einem hydraulischen Kranarm (2), namentlich ein Gelenkelement (1), das einerseits mit dem Kranarm (2) drehbar verbindbar ist und andererseits ebenfalls mit einem hydraulischen Rotator (3) drehbar verbindbar ist, der mit jeder beliebigen verwendeten Arbeits- oder Greifeinrichtung verbindbar ist, wobei das Gelenkelement (1) zwei Drehgelenk (11, 12) umfasst, die in einem geeigneten Abstand voneinander in einer Richtung der Längsachse des Gelenkelements (1) positioniert sind, namentlich ein oberes Drehgelenk (11), das auf der Seite des Kragarms (2) des Gelenkelements (1) positioniert ist, und

- ein unteres Drehgelenk (12), das auf der Seite des Rotators (3) des Gelenkelements (1) oder jedes beliebigen Arbeitsgeräts positioniert ist, so dass die Drehgelenke (11, 12) als kardananische Drehgelenk mit zwei Drehachse (110, 120) ausgebildet sind, welche die Drehung des Gelenkelements (1) relativ zu dem Kranarm (2) und/oder relativ zum Rotator (3) erlauben und die sich senkrecht zueinander erstrecken, und wobei das untere Drehgelenk (12) für die Drehverbindung des Gelenkelements (1) mit dem Rotator (3) in der Form eines Auges (121) ausgebildet ist, das mit einer Durchgangsbohrung (122) versehen ist, die entlang der Drehachse (120) des unteren Drehgelenks (12) gerichtet ist und dazu eingerichtet ist, einen Bolzen (37) aufzunehmen, während das obere Drehgelenk (11), das auf der Seite des Kranarms (2) des Gelenkelements (1) positioniert und zum Herstellen einer Drehverbindung mit diesem eingerichtet ist, gegabelt ist und zwei Vorsprünge (111, 112) umfasst, die voneinander beabstandet sind und jeder für sich mit einer Durchgangsbohrung (111', 112') versehen ist, die zum Aufnehmen eines zum Herstellen einer Verbindung mit dem Kranarm (2) dienenden Bolzens (13) eingerichtet ist, und wobei Hydraulikleitungen (41, 42, 43), die sich zwischen dem Kranarm (2) und dem Rotator (3) erstrecken, zwischen den Vorsprüngen (111, 112) des oberen Drehgelenks (11) des Gelenkelements (1) eingerichtet sind, **dadurch gekennzeichnet, dass** eine hohle zylindrische Buchse (113) durch die Bohrungen (111', 112') in den Vorsprüngen (111, 112) an dem oberen Drehgelenk (11) des Gelenkelements (1) auf der Seite des Kranarms (2) des Gelenkelements eingeführt ist, und zwei Lagerbuchsen (114', 114'') dort eingeführt sind und jede für sich an einem entsprechenden Endteil (113', 113'') davon positioniert ist, so dass der Bolzen (13), der zum Herstellen einer Drehverbindung zwischen dem Gelenkelement (1) und dem Kranarm (2) im Bereich des oberen Drehgelenks (11) des Gelenkelements (1) vorgesehen ist, durch sie eingeführt ist.
2. Gelenkelement nach Anspruch 1, **dadurch gekennzeichnet, dass** die Vorsprünge (111, 112) des oberen Drehgelenks (11) sich zu dem Kranarm (2) hin erstrecken und in einem geeigneten Abstand von der Buchse (113) durch ein Begrenzungsmittel (14) gebrückt sind und dass die Hydraulikleitungen (41, 42, 43) sich vom Kranarm (2) zu dem Gelenkelement (1) und dann zu dem Rotator (3) hin in einer derartigen Weise erstrecken, dass sie sich in dem Bereich des oberen Drehgelenks (11) des Gelenkelements (1) zwischen der Buchse (113) und dem Begrenzungsmittel (14) zu Hydraulikanschlüssen (31, 32, 33) an dem Rotator (3) hin erstrecken.
3. Gelenkelement nach Anspruch 2, **dadurch gekennzeichnet, dass** das Begrenzungsmittel (14) zylindrisch ist und sich parallel zu der Drehachse (110) des oberen Drehgelenks (11) des Gelenkelements (1) erstreckt.
4. Gelenkelement nach Anspruch 3, **dadurch gekennzeichnet, dass** das Begrenzungsmittel (14) als sich durch die Vorsprünge (111, 112) und zwischen diesen erstreckender Stift ausgebildet ist.
5. Gelenkelement nach Anspruch 2 oder 3, dadurch gekennzeichnet, dass das Begrenzungsmittel (14) in einem vorbestimmten Abstand (a) von der Buchse (113) des oberen Drehgelenks (11) ebenso wie in einem vorbestimmten Abstand von der Vertikalachse des Gelenkelements (1) positioniert ist, der durch den Winkel (φ) zwischen einer Tangente (t) an das Begrenzungsmittel (14) auf der Seite der Vertikalachse und der Vertikalachse selbst definiert ist.
6. Gelenkelement nach Anspruch 5, **dadurch gekennzeichnet, dass** der Abstand (a) zwischen dem Begrenzungsmittel (14) und der Buchse (113) 35 bis 55 mm beträgt und der Winkel (φ) zwischen einer Tangente (t) an das Begrenzungsmittel (14) auf der Seite der Vertikalachse und der Vertikalachse selbst 10 bis 30° beträgt.
7. Gelenkelement nach einem der Ansprüche 3 bis 6, **dadurch gekennzeichnet, dass** ein Rollenelement um das Begrenzungsmittel (14) herum angeordnet ist.
8. Gelenkelement nach einem der Ansprüche 1 bis 7, **dadurch gekennzeichnet, dass** mindestens eine zum Übertragen von Schmiermittel zu den Bereichen zwischen den Lagerbuchsen (114', 114'') und dem Bolzen (13) ausgebildete Schmiervorrichtung an der Buchse (113) vorgesehen ist, die an dem oberen Drehgelenk (11) auf der Seite des Kranarms (2) des Gelenkelements (1) angeordnet ist.
9. Gelenkelement nach einem der Ansprüche 1 bis 7, **dadurch gekennzeichnet, dass** mindestens eine zum Übertragen von Schmiermittel zu den Bereichen zwischen den Lagerbuchsen (114', 114'') und dem Bolzen (13) ausgebildete Schmiervorrichtung an dem Bolzen (13) vorgesehen ist, die an dem oberen Drehgelenk (11) auf der Seite des Kranarms (2) des Gelenkelements (1) angeordnet ist.
10. Gelenkelement nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Lagerbuchsen (114', 114'') in die Buchse (113) eingepresst sind.

Revendications

1. Élément de liaison (1) entre un outil rotatif ou un instrument de travail semblable et un bras de grue hydraulique (2), à savoir un élément de liaison (1), qui est d'une part raccordé de manière pivotante audit bras de grue (2) et d'autre part pivotant également avec un rotateur hydraulique (3), qui peut se connecter avec chaque accessoire de travail ou dispositif de préhension utilisé, dans lequel ledit élément de liaison (1) comprend deux articulations rotoïdes (11, 12), qui sont situées à une distance appropriée l'une de l'autre dans une direction de l'axe longitudinal de l'élément de liaison (1), à savoir une articulation rotoïde supérieure (11) située sur le côté du bras de grue (2) de l'élément de liaison (1) et une articulation rotoïde inférieure (12) située sur le côté du rotateur (3) de l'élément de liaison (1) ou de chaque accessoire de travail, de sorte que lesdites articulations rotoïdes (11, 12) sont conçues en tant que liaison pivot à Cardan avec deux axes de rotation (110, 120), qui permettent le pivotement de l'élément de liaison (1) par rapport au bras de grue (2) et/ou par rapport au rotateur (3), et qui s'étendent perpendiculairement les unes par rapport aux autres, et dans lequel l'articulation rotoïde inférieure (12) permettant une interconnexion de pivotement de l'élément de liaison (1) avec le rotateur (3) est conçue sous la forme d'un oeil (121), qui est fourni avec un trou traversant (122), qui est dirigé le long dudit axe de rotation (120) de l'articulation rotoïde inférieure (12) et est adapté pour recevoir un boulon (37), tandis que l'articulation rotoïde supérieure (11), qui est située sur le côté du bras de grue (2) de l'élément de liaison (1) et adaptée pour établir une interconnexion de pivotement avec celui-ci, bifurque et comprend deux protubérances (111, 112), qui sont espacées l'une de l'autre et sont chacune fournies elles-mêmes avec un trou traversant (111', 112') adapté pour recevoir un boulon (13) servant à établir une interconnexion avec le bras de grue (2), et dans lequel des conduits hydrauliques (41, 42, 43), qui s'étendent entre le bras de grue (2) et le rotateur (3), sont dirigés entre lesdites protubérances (111, 112) de l'articulation rotoïde supérieure (11) de l'élément de liaison (1), **caractérisé en ce qu'**une douille cylindrique creuse (113) est insérée à travers les trous (111', 112') dans les protubérances (111, 112) sur l'articulation rotoïde supérieure (11) de l'élément de liaison (1) sur le côté du bras de grue (2) de l'élément de liaison, et deux coussinets (114', 114'') sont insérés dans ceux-ci et sont chacun situés eux-mêmes sur une partie d'extrémité correspondante (113', 113'') de ceux-ci, de sorte que le boulon (13), qui est prévu pour établir une interconnexion de pivotement entre l'élément de liaison (1) et le bras de grue (2) dans la zone de l'articulation rotoïde supérieure (11) de l'élément de liaison (1), est inséré à travers ceux-
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2. Élément de liaison selon la revendication 1, **caractérisé en ce que** les protubérances (111, 112) de l'articulation rotoïde supérieure (11) s'étendent vers le bras de grue (2) et sont situées à une distance appropriée de la douille (113) reliée par un moyen de limitation (14), et **en ce que** les conduits hydrauliques (41, 42, 43) se dirigent du bras de grue (2) vers l'élément de liaison (1) et ensuite vers le rotateur (3) de telle sorte que dans la zone de l'articulation rotoïde supérieure (11) de l'élément de liaison (1), ils s'étendent entre la douille (113) et le moyen de limitation (14) vers les connecteurs hydrauliques (31, 32, 33) sur le rotateur (3).
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3. Élément de liaison selon la revendication 2, **caractérisé en ce que** le moyen de limitation (14) est cylindrique et s'étend parallèle audit axe de rotation (110) de l'articulation rotoïde supérieure (11) de l'élément de liaison (1).
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4. Élément de liaison selon la revendication 3, **caractérisé en ce que** le moyen de limitation (14) est conçu en tant que broche s'étendant le long desdites protubérances (111, 112) et entre elles.
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5. Élément de liaison selon la revendication 2 ou 3, **caractérisé en ce que** le moyen de limitation (14) est situé à une distance prédéterminée (a) de la douille (113) de l'articulation rotoïde supérieure (11) ainsi qu'à une distance prédéterminée de l'axe vertical de l'élément de liaison (1), qui est défini par un angle (φ) entre une tangente (t) au moyen de limitation (14) sur le côté dudit axe vertical et de l'axe vertical lui-même.
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6. Élément de liaison selon la revendication 5, **caractérisé en ce que** la distance (a) entre le moyen de limitation (14) et la douille (113) est de 35 à 55 mm, et l'angle (φ) entre une tangente (t) au moyen de limitation (14) sur le côté de l'axe vertical et dudit axe vertical lui-même est 10 à 30°.
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7. Élément de liaison selon l'une quelconque des revendications 3 à 6, **caractérisé en ce qu'**un élément de roulement est disposé autour du moyen de limitation (14).
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8. Élément de liaison selon l'une quelconque des revendications 1 à 7, **caractérisé en ce que** l'au moins un dispositif de lubrification adapté pour transférer du lubrifiant vers les zones entre les coussinets (114', 114'') et le boulon (13) est prévu sur la douille (113), qui est montée sur l'articulation rotoïde supérieure (11) sur le côté du bras de grue (2) de l'élément de liaison (1).
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9. Élément de liaison selon l'une quelconque des revendications 1 à 7, **caractérisé en ce qu'**au moins un dispositif de lubrification adapté pour transférer du lubrifiant vers les zones entre les coussinets (114', 114") et le boulon (13) est prévu sur le boulon (13), qui est monté sur l'articulation rotoïde supérieure (11) sur le côté du bras de grue (2) de l'élément de liaison (1). 5
10. Élément de liaison selon l'une quelconque des revendications précédentes, **caractérisé en ce que** les coussinets (114', 114") sont pressés dans la douille (113). 10

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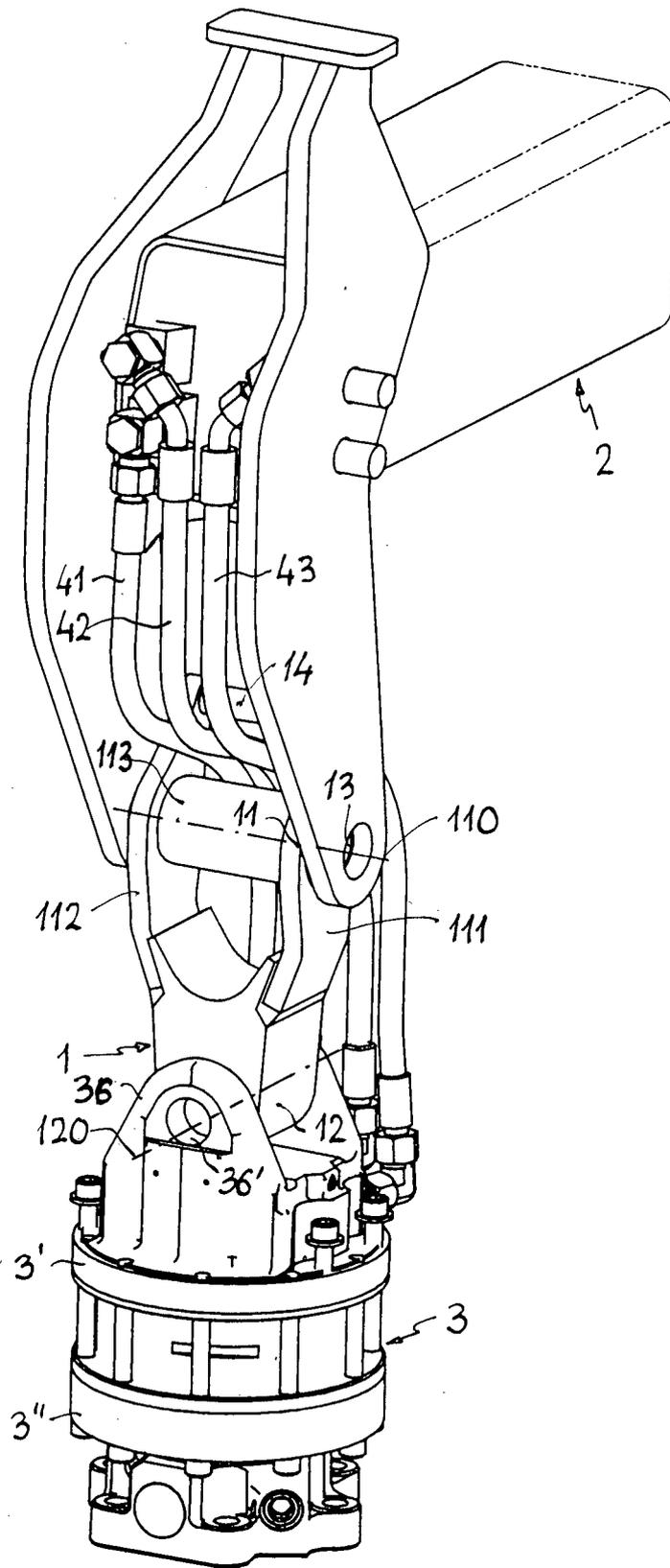


Fig. 1

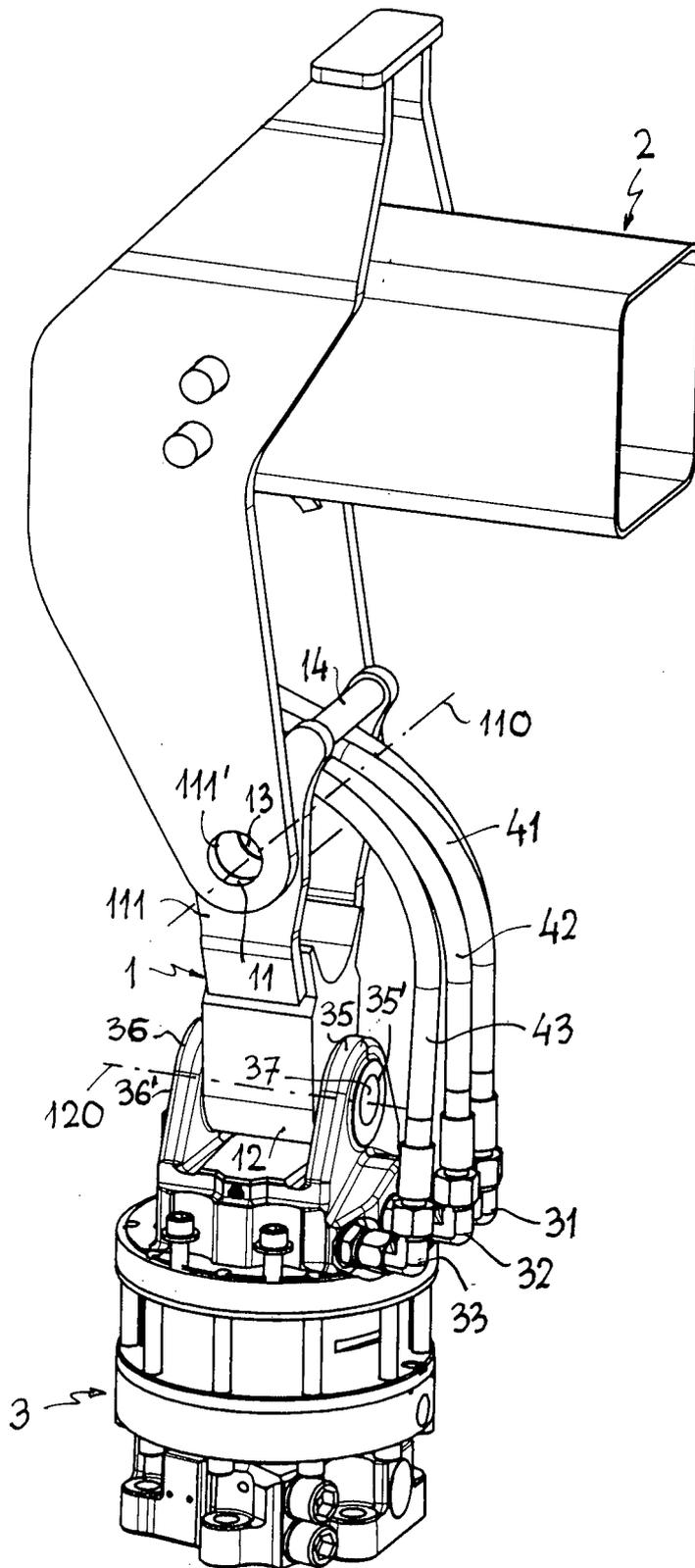


Fig. 2

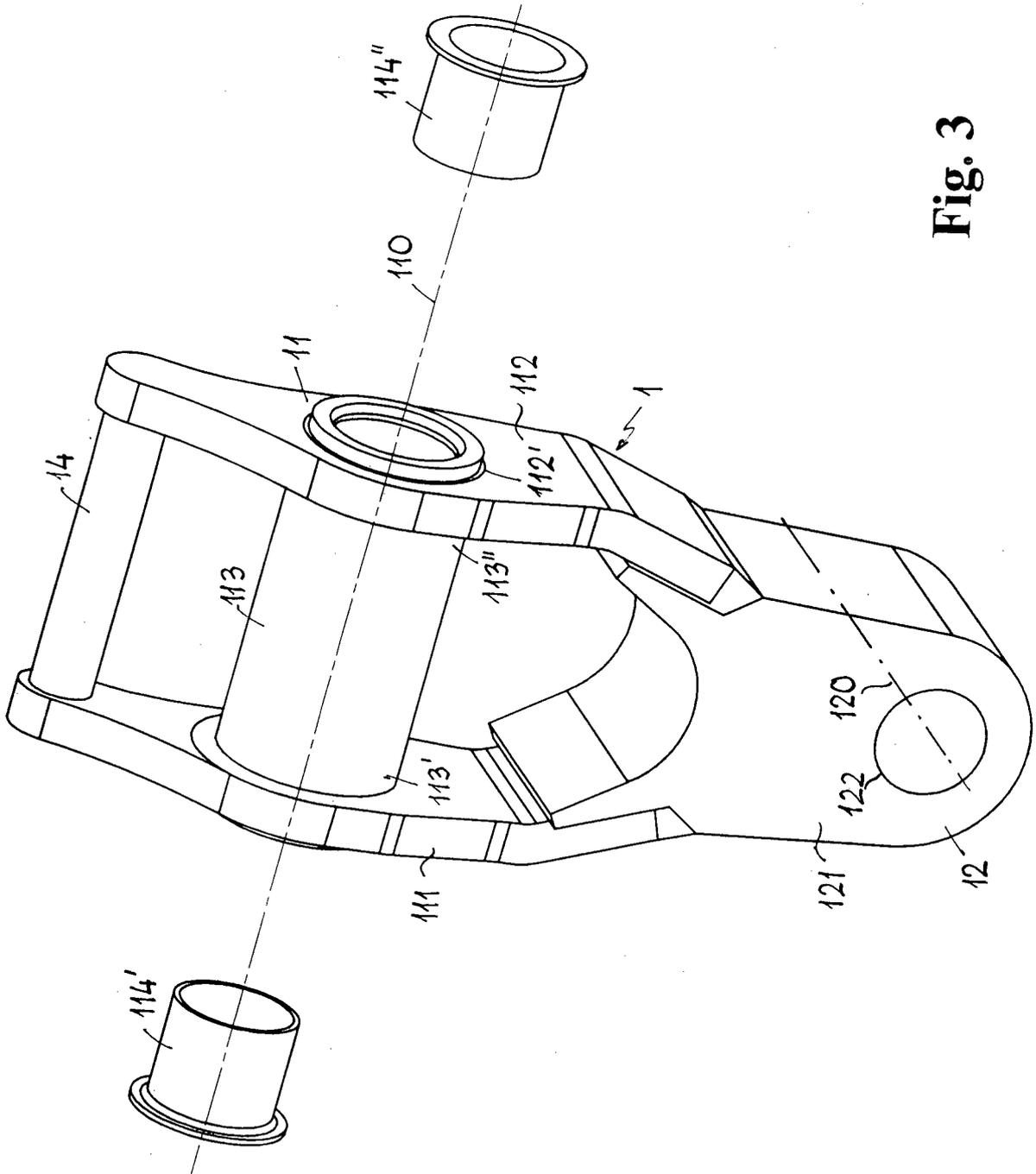


Fig. 3

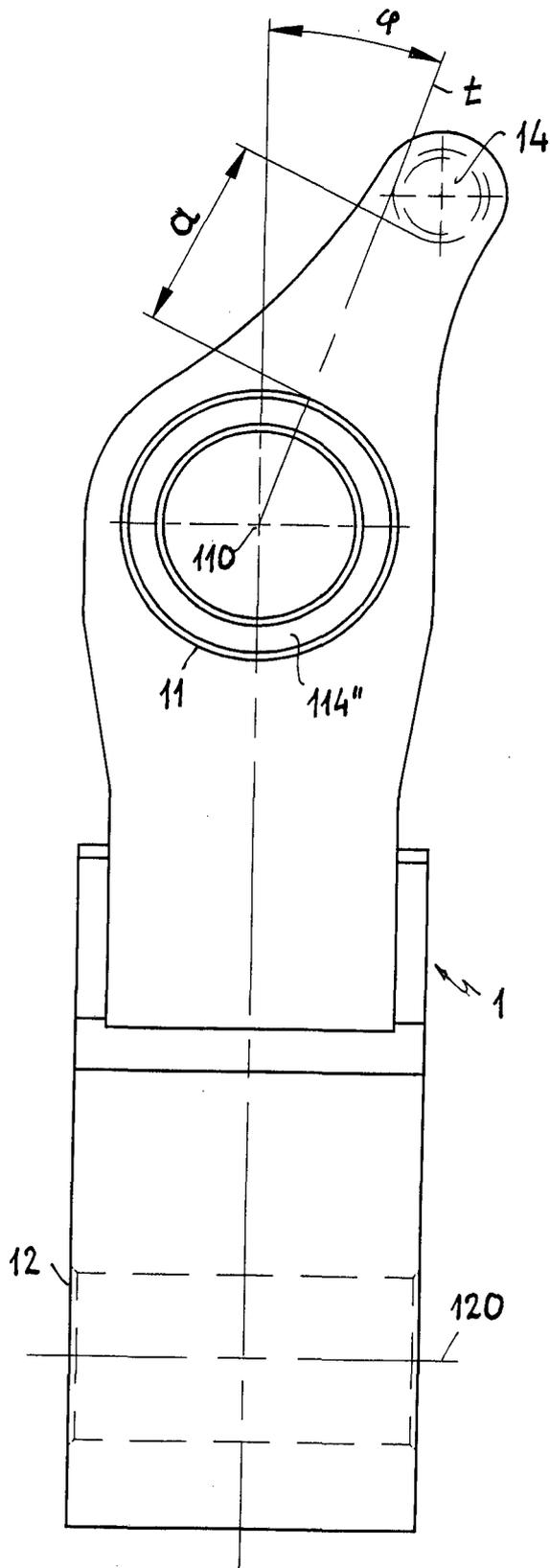


Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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