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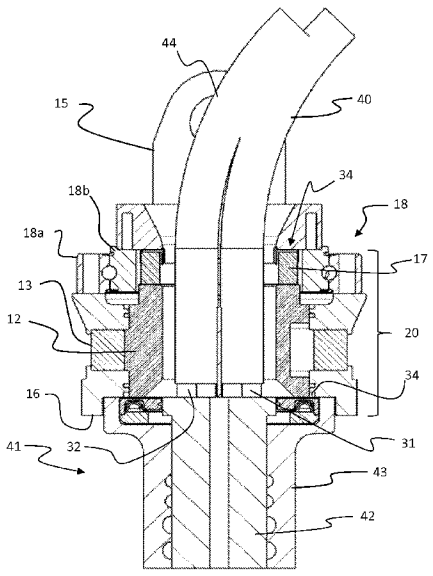
(54) Title: Rotator arrangement with hydraulic coupling through rotor

(56) Cited documents: WO 2012134370 A1 · US 20050017528 A1 · US 6435235 B1 · US 5267504 A · WO 2016099372 A1

(57) Abstract:

The invention relates to a rotator arrangement (10) for providing a rotating movement between a crane arm or the like and a hydraulic tool, the rotator arrangement comprising: a first attachment piece (15) arranged to be attached to the crane arm or the like, a second attachment piece (16) arranged to be attached to the hydraulic tool, wherein a motor comprising a stator (13) and a rotor (12), the rotor (12) is arranged inside the stator so as to rotate with respect to the stator (13) around a same axis of rotation (A) as the first and second attachment pieces. Hydraulic couplings (31) to provide the hydraulic tool with hydraulic fluid are arranged facing the first attachment piece (15) and substantially parallel to the axis of rotation (A) through the rotor (12) of the motor (11), the rotor (12) being arranged inside a casing (20), wherein a torque transmission unit (14) is arranged to transmit a rotational movement provided by the motor (11) between the first and second attachment pieces (15,16), the torque transmission unit transmitting said rotational movement without transmitting substantial axial and radial loads.



ABSTRACT

The invention relates to a rotator arrangement (10) for providing a rotating movement between a crane arm or the like and a hydraulic tool, the rotator arrangement comprising: a first attachment piece (15) arranged to be attached to the crane arm or the like, a second attachment piece (16) arranged to be attached to the hydraulic tool, wherein a motor comprising a stator (13) and a rotor (12), the rotor (12) is arranged inside the stator so as to rotate with respect to the stator (13) around a same axis of rotation (A) as the first and second attachment pieces. Hydraulic couplings (31) to provide the hydraulic tool with hydraulic fluid are arranged facing the first attachment piece (15) and substantially parallel to the axis of rotation (A) through the rotor (12) of the motor (11), the rotor (12) being arranged inside a casing (20), wherein a torque transmission unit (14) is arranged to transmit a rotational movement provided by the motor (11) between the first and second attachment pieces (15,16), the torque transmission unit transmitting said rotational movement without transmitting substantial axial and radial loads.

ROTATOR ARRANGEMENT WITH HYDRAULIC COUPLING THROUGH ROTOR

TECHNICAL FIELD

[0001] The invention relates to a rotator arrangement for providing a rotating movement to a hydraulic tool attached to said rotator arrangement.

BACKGROUND

[0002] Rotator arrangements are widely used in foresting, harvesting or the like where a carrier, truck, tractor or the like carries an arrangement for handling excavators, timber tools, harvest tools or the like. Often such arrangements are hydraulically driven and include a crane arm, wherein the rotator arrangement is arranged to the free end of the crane arm. The rotator arrangement typically includes a motor, i.e. a hydraulic motor, to provide the rotational movement.

[0003] A challenge related to such rotator arrangements is that the rotators are exposed to heavy forces both radially and axially. Conventionally, this has been solved by dimensioning the rotator arrangement and specifically the motor with components adapted to withstand very high efforts. A problem is that that the motor, and specifically the fit between the stator and rotor needs to be very accurate and precise, which is difficult to achieve in combination with the high demands concerning the mechanical strength.

[0004] In WO 2012/134370 a rotator arrangement is described in which the forces are arranged to be taken up in an arrangement arranged to leave the interaction between the rotor and stator separated from the load distribution other than the torque provided by the motor. The arrangement is advantageous but it is also relatively heavy and space demanding, especially in the radial direction.

[0005] Therefore, there is a need of a rotator arrangement that is lighter and more compact especially radially than an ordinary arrangement, but that is capable of withstanding high efforts, without compromising the accuracy and durability of the arrangement.

SUMMARY OF THE INVENTION

[0006] It is an object of the present invention to provide a rotator arrangement for providing a rotational movement, which is compact and which is arranged to provide the rotational movement without undue stress between the stator and rotor. A further object is to provide for a tangle free cable and hose arrangement.

[0007] The invention relates to a rotator arrangement for providing a rotating movement, the rotator arrangement comprising: a first attachment piece arranged to be attached to the crane arm or the like, a second attachment piece arranged to be attached to the hydraulic tool, a casing joining the first attachment piece to the second attachment piece, which casing is arranged to carry the loads of the hydraulic tool and includes a bearing or the like allowing a first part of the casing to rotate with respect to a second part of the casing, and a hydraulic rotation motor arranged to provide a rotational movement between the first and second attachment pieces around an axis of rotation, the motor comprising a stator and a rotor, the rotor being arranged inside the stator so as to rotate with respect to the stator around the same axis of rotation as the first and second attachment pieces. Further, hydraulic couplings to provide the hydraulic tool with hydraulic fluid, are arranged facing the first attachment piece and substantially parallel to the axis of rotation through the rotor of the motor, the rotor being arranged at least partly inside said casing, wherein a torque transmission unit is arranged to transmit a rotational movement provided by the motor between the first and second attachment pieces, the torque transmission unit transmitting said rotational movement without transmitting substantial axial and radial loads, wherein a swivel connector is arranged via which the hydraulic fluid to the hydraulic tool is arranged to be provided, and wherein the motor is hollow allowing hydraulic hoses to pass through the interior of both the rotor and stator along the direction of the axis of rotation, the hydraulic couplings being provided on a central portion of the swivel connector.

[0008] With said arrangement hoses and cables may be arranged centrally such that they will not limit rotation of the rotator. Further, this is achieved in a slim construction in which the precision between the rotor and stator of is not compromised by heavy loads acting on the rotator. In one embodiment the swivel is not a part of the rotator, but is arranged as a separate part, connected to the rotator.

[0009] The swivel connector makes sure that the hydraulic hoses for the hydraulic tool will not hinder the rotation of the rotator.

[0010] According to yet another specific embodiment of the invention the central portion of the swivel connector is arranged to rotate with the rotor, which is arranged inside the stator and a swivel house of the swivel connector is arranged to house the central portion of the swivel connector and is rotationally connected to the stator.

[0011] In one specific embodiment hydraulic couplings to provide the hydraulic motor with hydraulic fluid are arranged facing the first attachment piece and substantially parallel to the axis of rotation via or through the rotor of the motor.

[0012] In an alternative embodiment the hydraulic couplings to provide the hydraulic motor with hydraulic fluid are arranged separated from the hydraulic couplings to provide the hydraulic tool with hydraulic fluid, at a distance from and/or off-set from the axis of rotation of the rotor. In this embodiment the hydraulic fluid is preferably fed directly to the motor without the need of swiveling the supplied hydraulic fluid, i.e. said hydraulic couplings lead directly to the motor and not via a swivel connector.

[0013] In one specific embodiment the rotor and a central portion of the swivel connector are integrated and the hydraulic couplings to provide the hydraulic tool with hydraulic fluid are arranged are provided on an axial end of the integrated rotor and said central portion of the swivel connector facing the first attachment portion.

[0014] Preferably, an angle meter is arranged to monitor the rotation of the first attachment piece with respect to the second attachment piece. The angle meter may be provided between any two parts that rotate with respect to each as a result of the rotation provided by the motor.

[0015] In a specific embodiment the torque transmission unit comprises an connective element arranged to slide in mating radial track extending in a radial direction orthogonal to the axis of rotation, so as to provide a connection between the motor and one of the attachment pieces, which connection provides substantially no gap between the motor and said attachment piece in a direction of rotation around the axis of rotation, but includes a freedom to move in a radial direction orthogonal to the axis of rotation, and in an axial direction along the axis of rotation.

[0016] In another specific embodiment the torque transmission unit comprises an intermediate element between the motor and the casing, which intermediate element comprises substantially no gap between the motor and the attachment piece in a direction of rotation around the axis of rotation, wherein the torque transmission unit includes a freedom to move both in a plane orthogonal to the axis of rotation, and in an axial direction along the axis of rotation. With this arrangement substantially no axial or radial forces are transmitted between the rotor and the stator.

[0017] In yet another specific embodiment the rotator further comprises an electric connection arranged facing the first attachment piece and substantially parallel to the axis of rotation via or through the rotor of the motor, wherein an electric swivel is arranged to provide electric signals and/or power to the hydraulic tool.

[0018] In yet another specific embodiment the rotator further comprises a coupling for urea connection arranged facing the first attachment piece and substantially parallel to the axis of rotation via or through the rotor of the motor, wherein a swivel is arranged to provide urea to the hydraulic tool.

[0019] Other embodiments and advantages of the invention will be apparent from the following detailed description.

SHORT DESCRIPTION OF THE DRAWINGS

[0020] Below the invention will be described in detail with reference to the accompanying drawings, of which:

Fig. 1 is a perspective view of a rotator arrangement in accordance with a first embodiment of the invention;

Fig. 2 is an exploded view of the rotator attachment piece, torque transmission unit and rotor of a rotator arrangement in accordance with the first embodiment;

Fig. 3 is a sectional view of the rotator arrangement in accordance with the first embodiment;

Fig. 4 is a sectional view of a rotator arrangement in accordance with a second embodiment of the invention;

Fig. 5 is an exploded view of a specific embodiment of a torque transmission unit between a rotor and an attachment piece; and

Fig. 6 is an exploded view of the torque transmission unit in fig. 4 seen from the opposite side.

DETAILED DESCRIPTION OF THE SHOWN EMBODIMENT

[0021] In figure 1 a first embodiment of a rotator arrangement 10 in accordance with the invention is shown. The rotator arrangement 10 is arranged for providing a rotating movement between a crane arm and a hydraulic tool, such as grip arm, shovel, harvester or the like. The rotator arrangement comprises a first attachment piece 15 arranged to be attached to the crane arm or the like, and a second attachment piece 16 arranged to be attached to the hydraulic tool. A casing 20 is arranged and joins the first attachment piece 15 to the second attachment piece 16. The casing 20 is arranged to carry the loads of the hydraulic tool and includes a bearing 18 or the like for allowing a first part of the casing to

rotate with respect to a second part of the casing. A swivel 41 for swiveling hydraulic fluid to the hydraulic tool is arranged in connection to the motor 11. The second attachment piece 16 is arranged between said motor 11 and the swivel connector 41. The swivel connector 41 is hence arranged to be housed within the hydraulic tool (not shown).

[0022] The motor 11 is arranged to provide a rotational movement between the first and the second attachment pieces 15,16 around an axis of rotation A, i.e. the axial axis of the motor. The motor comprises a stator 13 and a rotor 12, the rotor 12 being arranged inside the stator so as to rotate with respect to the stator 13 around the same axis of rotation A as the first and second attachment pieces. Hydraulic couplings 31 arranged to connect to hydraulic hoses 40 to provide the hydraulic tool with hydraulic fluid are arranged facing the first attachment piece 15 and substantially parallel to the axis of rotation A. In accordance with the invention the hydraulic hoses are arranged to or through the rotor 12 of the motor 11. In the first embodiment shown in figures 1-3 the hydraulic hoses are arranged through the rotor 12 of the motor 11, the rotor 12 being hollow and arranged inside said casing 20. Further, in this first embodiment the casing 20 is comprised of the stator 13 and a bearing 18, resulting in a very slim construction. Further, a second set of hydraulic couplings 32, to provide the motor 11 with hydraulic fluid from hoses 44, is arranged.

[0023] An important aspect of the invention is that the rotor 12 carries no axial or radial load. This is achieved in that the casing 20 is arranged to carry axial and radial loads acting between the first and second attachment pieces 15,16. Further though, a torque transmission unit 14 is arranged to transmit a rotational movement provided by the motor 11 between the first and second attachment pieces, the torque transmission unit 14 transmitting said rotational movement without transmitting substantial axial or radial loads.

[0024] As is shown in exploded view in figure 2 the torque transmission unit 14 comprises an intermediate element 17 arranged between the motor 11 and the casing 20. In the shown embodiment it is arranged between the rotor 12 and the first attachment piece 15. The intermediate element 17 comprises substantially no gap between the rotor 12 and the first attachment piece 15 in a direction of rotation around the axis of rotation A. On the contrary, the torque transmission unit 14 includes a freedom to move both in a plane X,Y orthogonal to the axis of rotation A, and in the axial direction along the axis of rotation A. Hence, substantially no axial or radial forces are transmitted between the rotor 12 and the stator 13. The torque transmission unit 14 may alternatively be arranged between the rotor 12 and the second attachment piece 16, the stator in such an embodiment being connected to the first attachment piece 15 instead of the second attachment piece 16. Further, the torque transmission unit 14 may be arranged to connect the rotation of the stator to one of

the attachment pieces, wherein the rotor is connected to the other of the two attachment pieces. Such an embodiment would however demand a specific casing not incorporating the stator.

[0025] The specific intermediate element 17 of the torque transmission unit 14 of the shown first embodiment comprises a first set of engagement portions 21, in the form of protrusions in the axial direction A with parallel sides, which are to be received in engagement parts 26 in the form of recesses in the rotor attachment piece 15. A second set of engagement portions 22, also in the form of protrusions in the axial direction A with parallel sides, are received in engagement parts 25 in the form of recesses in the rotor 12. The first set of engagement portions 21 are arranged to allow a freedom of movement with respect to said rotor in a first direction X that is orthogonal to the axis of rotation A and the second set of engagement portions 22 are arranged to allow a freedom of movement with respect to said rotor attachment piece 15 in a second direction Y that is orthogonal to the axis of rotation A and to said first direction X. The parallel sides of the respective protrusions of the engagement portions 21,22 are arranged to slide within the parallel sides of the respective engaging recess of the engagement parts 25,26. Both sets of engagement portions 21,22 allow a certain freedom of movement in the axial direction A. Typically, the width of the intermediate element 17 is less than the space available provided between rotor 12 and rotor attachment part 15, such that an axial gap 34 is available to provide the certain freedom of movement in the axial direction A, as indicated in fig 3. The sets of engagement portions 21,22 of the intermediate element 17 may extend radially or axially, whatever is most suitable in any specific application.

[0026] Further, in a simpler embodiment shown in figs. 5 and 6 the torque transmission unit comprises a connective element 37, typically in the form of a dowel pin, that is arranged in a mating track 38 that extends radially and in which connective element 37 may travel in the radial direction. In the embodiment shown in figs. 4 and 5 the connective element 37 is fixed in a bore 39 in the first attachment part 15, which connects to the rotor 12, wherein the rotor comprises a mating track 38 that extends radially, said track 38 having a width that corresponds to the width of the connective element 37 so as to not allow any gap in the rotational direction but to allow a sliding motion in the radial direction. In an alternative embodiment two connective elements are arranged to slide in a track extending from side to side or two corresponding mating tracks extending parallel along the same line on opposite sides of the rotor 12. As an alternative the connective element(s) 37 may be arranged on the rotor and the track(s) 39 may be arranged in the first or second attachment part. Further, the

interaction may instead be arranged between the stator and one of the first and second attachment parts.

[0027] As is shown in fig. 3 a swivel connector 41 is arranged via which the hydraulic fluid to the hydraulic tool (not shown) is arranged to be provided. The hydraulic tool is arranged to be attached to the second attachment part 16, which in the shown embodiment is arranged between the stator 12 and the the house 43 of the swivel connector 41. The swivel connector 41 is hence arranged to be housed at least partly inside the hydraulic tool (not shown). The house 43 of the swivel connector 41 is arranged to rotate with the stator 13 of the motor, whereas the central portion 42 of the swivel connector 41 is arranged to rotate with the rotor 12.

[0028] In the first embodiment the motor 11 is hollow allowing the hydraulic hoses 40 to pass through the interior of both the rotor 12 and stator 13 along the direction of the axis of rotation A. The hydraulic couplings are provided on a central portion 42 of the swivel connector 41. As mentioned above the central portion 42 of the swivel connector 41 is arranged to rotate with the rotor 12, which is arranged inside the stator 13. A swivel house 43 of the swivel connector 41 is arranged to house the central portion 42 of the swivel connector 41 and is rotationally connected to the stator 13.

[0029] As shown in fig. 3 the hydraulic couplings 32 for connection to the hydraulic hoses 44 to provide the hydraulic motor 11 with hydraulic fluid may be arranged next to the hydraulic couplings 31 for the hydraulic tool, hence facing the first attachment piece 15 substantially parallel to the axis of rotation A through the rotor 12 of the motor 11. The hydraulic fluid for the motor is passed from the rotor 12, through the swivel connector 41 and back to the stator 13 of the motor 11.

[0030] An angle meter 34 is arranged to monitor the rotation of the first attachment piece 15 with respect to the second attachment part 16, e.g. by monitoring the rotation of the rotor 12 with respect to the stator 13 or the housing 20. The angle meter could be located at any location between two pieces of the rotator 10 that rotate with respect to each other when the motor 11 is driven.

[0031] In a second embodiment of the invention shown in fig. 4 the hydraulic couplings 33 to provide the hydraulic motor 11 with hydraulic fluid are arranged separate from the hydraulic couplings 31 to provide the hydraulic tool with hydraulic fluid, at a distance from and/or off-set from the axis of rotation A of the rotor 12. In this embodiment the hydraulic fluid provided via the hydraulic couplings 33 to drive the hydraulic motor 11 does not need to be swiveled. This is due to that the first attachment piece 15, from which the hydraulic hoses to

the motor 11 arrives, rotates with the casing 20, such that the hydraulic couplings 33 may be arranged directly in the casing, typically into the stator 13 of the motor.

[0032] This is due to that, in this second embodiment, the stator 13 is rotationally connected to the first attachment piece 15, which is arranged to be fastened to a crane arm or the like from which the hydraulic hoses are provided. An end piece 50 of such a crane arm is shown in fig. 4. The rotor 12 is thus arranged to rotate with the second attachment piece 16 and with the house 43 of the swivel connector 41. The central portion 42 of the swivel connector 41 is arranged to rotate with the stator 13. In the shown embodiment a tube 48 is provided to connect a lower portion of the first attachment piece 15 to the central portion 42 of the swivel connector 41.

[0033] As for the first embodiment the second attachment piece 16 of the second embodiment is arranged between the motor 11 and the swivel connector 41. The swivel 41 is hence arranged to be housed within the hydraulic tool.

[0034] Also visible in fig. 4 is an electric swivel 47 which is arranged in connection to the swivel connector 41 to provide electric power and signals to the hydraulic tool or control functions arranged in connection thereto. Namely, most hydraulic tools have electrically controlled functions, which needs to be electrically controlled and/or powered, and in order to provide the necessary electricity over the rotating parts without the need of hindering cables the electric power and signals needs to be swiveled. The electric cable(s) is/are preferably arranged alongside the hydraulic couplings facing the first attachment piece 15 and substantially parallel to the axis of rotation A. Hence in accordance with the first and second embodiment of the invention the electric cable(s) is/are arranged through the rotor 12 of the motor 11. Likewise, a conduit for providing urea may be arranged alongside the hydraulic hoses and electric cables. Urea is used in forestry applications and therefore the possibility of providing urea should preferably be available to all rotators. Further, a swivel for Urea is hence also provided in connection to the swivel connector 41.

[0035] An advantage of the inventive embodiments with respect to prior art rotators is that the hydraulic hoses will not limit the rotation of the motor 11. Further, this may be achieved in a slimmed, non-bulky construction because the couplings are arranged centrally along the axial direction A to or through a rotor that is not carrying loads, which may be accomplished due to the torque transmission unit 14.

[0036] Above the invention has been described with reference to specific embodiments. The invention is however no limited to these embodiments. For instance, the invention comprises any feasible combination of the shown embodiments as well as other

not shown embodiment with similar functionality. The invention is only limited by the appended claims.

CLAIMS

1. A rotator arrangement (10) for providing a rotating movement between a crane arm or the like and a hydraulic tool, the rotator arrangement comprising:
   - a first attachment piece (15) arranged to be attached to the crane arm or the like,
   - a second attachment piece (16) arranged to be attached to the hydraulic tool,
   - a casing (20) joining the first attachment piece (15) to the second attachment piece (16), which casing (20) is arranged to carry the loads of the hydraulic tool and includes a bearing (18) or the like allowing a first part of the casing (20) to rotate with respect to a second part of the casing (20), and
   - a hydraulic rotation motor (11) arranged to provide a rotational movement between the first and second attachment pieces (15,16) around an axis of rotation (A), the motor comprising a stator (13) and a rotor (12), the rotor (12) being arranged inside the stator (13) so as to rotate with respect to the stator (13) around the same axis of rotation (A) as the first and second attachment pieces, **characterised in** that hydraulic couplings (31) to provide the hydraulic tool with hydraulic fluid are arranged facing the first attachment piece (15) and substantially parallel to the axis of rotation (A) through the rotor (12) of the motor (11), the rotor (12) being arranged at least partly inside said casing (20), wherein a torque transmission unit (14) is arranged to transmit a rotational movement provided by the motor (11) between the first and second attachment pieces (15,16), the torque transmission unit transmitting said rotational movement without transmitting substantial axial and radial loads and wherein the motor (11) is hollow allowing hydraulic hoses (40) to pass through the interior of both the rotor (12) and stator (13) along the direction of the axis of rotation (A), and wherein a swivel connector (41) is arranged via which the hydraulic fluid to the hydraulic tool is arranged to be provided, the hydraulic couplings (31) being provided on a central portion (42) of the swivel connector (41).

2. The rotator arrangement (10) according to claim 1, wherein the central portion (42) of the swivel connector (41) is arranged to rotate with the rotor (13), which is arranged inside the stator (12) and a swivel house (43) of the swivel connector (41) is arranged to house the central portion (42) of the swivel connector (41) and is rotationally connected to the stator (13).

3. The rotator arrangement (10) according to claim 2, wherein hydraulic couplings (32) to provide the hydraulic motor (11) with hydraulic fluid are arranged next to the hydraulic couplings (31) for the hydraulic tool, facing the first attachment piece (15)

and substantially parallel to the axis of rotation (A) through the rotor (12) of the motor (11).

4. The rotator arrangement (10) according to claim 1, wherein the stator (13) is rotationally connected to the first attachment piece (15), and wherein hydraulic couplings (33) to provide the hydraulic motor (11) with hydraulic fluid are arranged separated from the hydraulic couplings (31) to provide the hydraulic tool with hydraulic fluid, at a distance from and/or off-set from the axis of rotation (A) of the rotor (12).

5. The rotator arrangement (10) according to claim 4, wherein the hydraulic couplings (33) to provide the hydraulic motor (11) with hydraulic fluid are led directly to the motor (11) and not via a swivel connector.

6. The rotator arrangement (10) according to anyone of the preceding claims, wherein an angle meter (34) is arranged to monitor the rotation of the first attachment piece (15) with respect to the second attachment piece (16).

7. The rotator arrangement (10) according to any one of the preceding claims, wherein the torque transmission unit (14) comprises a connective element (37) arranged to slide in mating radial track (38) extending in a radial direction orthogonal to the axis of rotation (A), so as to provide a connection between the motor (11) and one of the attachment pieces (15,16), which connection provides substantially no gap between the motor (11) and said attachment piece (15,16) in a direction of rotation around the axis of rotation (A), but includes a freedom to move in a radial direction orthogonal to the axis of rotation (A), and in an axial direction along the axis of rotation (A).

8. The rotator arrangement (10) according to anyone of the claims 1-6, wherein the torque transmission unit (14) comprises an intermediate element (17) between the rotor and the rotor attachment piece (15), which intermediate element (17) comprises a first set of engagement portions (21) that are arranged with a freedom of movement with respect to said rotor in a first direction (X) that is orthogonal to the axis of rotation (A), and a second set of engagement portions (22) that are arranged with a freedom of movement with respect to said rotor attachment piece (15) in a second direction (Y) that is orthogonal to the axis of rotation (A) and to said first direction (X), wherein substantially no gap exists between the first and second set of engagement portions (21,22), respectively and the rotor attachment piece (15) in a direction of rotation around the axis of rotation (A).

9. The rotator arrangement (10) according to claim 8, wherein the first set of engagement portions (21) and the second set of engagement portions (22) are arranged with a freedom of movement with respect to said rotor attachment piece 15 in an axial direction along the axis of rotation (A).

10. The rotator arrangement (10) according to anyone of the preceding claims, wherein the rotator further comprises an electric connection arranged alongside the hydraulic couplings (31) facing the first attachment piece (15) and substantially parallel to the axis of rotation (A) through the rotor (12) of the motor (11), and wherein an electric swivel is arranged to provide electric signals and/or power to the hydraulic tool.

11. The rotator arrangement (10) according to anyone of the preceding claims, wherein the rotator further comprises a coupling for urea connection arranged facing the first attachment piece (15) and substantially parallel to the axis of rotation (A) through the rotor (12) of the motor (11), and wherein a swivel is arranged to provide urea to the hydraulic tool in connection to the swivel connector (41).

I följande bilaga finns en översättning av patentkraven till svenska. Observera att det är patentkravens lydelse på engelska som gäller.

A Swedish translation of the patent claims is enclosed. Please note that only the English claims have legal effect.

PATENTKRAV

1. Rotatoranordning (10) för att åstadkomma en vridrörelse mellan en kranarm eller liknande och ett hydrauliskt verktyg, varvid rotatoranordningen innefattar:

- ett första fäste (15) anordnat att vara fäst vid kranarmen eller liknande,

- ett andra fäste (16) anordnat att fästas på verktyget,

- ett hölje (20) som förbinder det första fästet (15) med det andra fästet (16), vilket hölje (20) är anordnat att bära det hydrauliska verktygets laster och innefattar ett bärlager (18) eller liknande som medger rotation av en första del av höljet (20) med avseende på en andra del av höljet (20), och

en hydraulisk rotationsmotor (11) anordnad att åstadkomma en rotationsrörelse mellan det första och andra fästet (15, 16) runt en rotationsaxel (A), varvid motorn innefattar en stator (13) och en rotor (12), och varvid rotorn (12) är anordnad inuti statorn (13) för att rotera i förhållande till statorn (13) kring samma rotationsaxel (A) som det första och det andra fästet, **kännetecknad av** att hydraulkopplingar (31) för att förse det hydrauliska verktyget med hydraulfluid är anordnade mot det första fästet (15) och väsentligen parallellt med rotationsaxeln (A) genom motorns (11) rotor (12), varvid rotorn (12) är anordnad vid åtminstone delvis inuti höljet (20), varvid en vridmomentöverföringsenhet (14) är anordnad att överföra en rotationsrörelse som tillhandahålls av motorn (11) mellan de första och andra fästena (15, 16), varvid momentöverföringsenheten överför rotationsrörelse utan att väsentligen överföra axiella och radiella laster och varvid motorn (11) är ihålig så att hydrauliska slangar (40) kan passera genom både rotorns (12) och statorns (13) inre längs rotationsaxeln (A), och varvid en svivelkoppling (41) är anordnad, via vilken hydraulfluid till det hydrauliska verktyget är anordnad att tillhandahållas, varvid de hydrauliska kopplingarna (31) är anordnade på ett centralt parti (42) av svivelkopplingen (41).

2. Rotatoranordningen (10) enligt patentkrav 1, varvid svivelkopplingens (41) centrala parti (42) är anordnat att rotera med rotorn (13) som är anordnad inuti statorn (12) och ett svivelhus (43) av svivelkoppling (41) är anordnat att inhysa svivelkopplingens (41) centrala del (42) och är roterbart förbundet med statorn (13).

3. Rotatoranordningen (10) enligt patentkrav 2, varvid hydraulkopplingar (32) för att förse hydraulmotorn (11) med hydraulfluid är anordnade vid hydraulkopplingarna (31) för det hydrauliska verktyget vända mot det första fästet (15) och väsentligen parallellt med rotationsaxeln (A), genom motorns (11) rotor (12).

4. Rotatoranordningen (10) enligt patentkrav 1, varvid statorn (13) är roterbart förbunden med det första fästet (15) och varvid hydraulkopplingar (33) för att förse hydraulmotorn (11) med hydraulfluid är anordnad åtskilda från hydraulkopplingarna (31) för att förse det hydrauliska verktyget med hydraulfluid, på avstånd från och/eller off-set mot rotorns (12) rotationsaxel (A).

5. Rotatoranordningen (10) enligt patentkrav 4, varvid hydraulkopplingarna (33) för att förse hydraulmotorn (11) med hydraulfluid leds direkt till motorn (11) och inte via en svivelkoppling.

6. Rotatoranordning (10) enligt något av de föregående patentkraven, varvid en vinkelmätare (34) är anordnad att övervaka rotationen hos det första fästet (15) med avseende på det andra fästet (16).

7. Rotatoranordningen (10) enligt något av föregående patentkrav, varvid momentöverföringsenheten (14) innefattar ett anslutningselement (37) anordnat att glida i ett matchande radialspår (38) som sträcker sig i en radiell riktning, vinkelrätt mot rotationsaxeln (A) för att åstadkomma en koppling mellan motorn (11) och en av fästdelarna (15, 16), vilken koppling

väsentligen saknar spel mellan motorn (11) och fästdelen (15, 16) i en rotationsriktning runt rotationsaxeln (A), men medger rörelse i en radiell riktning, vinkelrätt mot rotationsaxeln (A), samt i en axiell riktning längs rotationsaxeln (A).

8. Rotatoranordningen (10) enligt något av patentkraven 1-6, varvid momentöverföringsenheten (14) innefattar ett mellanliggande element (17) mellan rotorn och rotorfästet (15), vilket mellanliggande element (17) innefattar en första uppsättning ingreppspartier (21) som är anordnade att kunna röra sig i förhållande till rotorn i en första riktning (X) som är vinkelrät mot rotationsaxeln (A), samt en andra uppsättning ingreppspartier (22) som är anordnade att kunna röra sig i förhållande till nämnda rotorfäste (15) i en andra riktning (Y) som är vinkelrät mot rotationsaxeln (A) och den första riktningen (X), varvid det i väsentligen inte finns något spel mellan den första respektive andra uppsättningen av ingreppspartier (21, 22) och rotorfästet (15) i en rotationsriktning runt rotationsaxeln (A).

9. Rotatoranordningen (10) enligt patentkrav 8, varvid den första uppsättningen ingreppspartier (21) och den andra uppsättningen ingreppspartier (22) är anordnade att kunna röra sig i förhållande till nämnda rotorfäste (15) i en axiell riktning längs rotationsaxeln (A).

10. Rotatoranordningen (10) enligt något av föregående patentkrav, varvid rotatorn vidare innefattar en elektrisk anslutning anordnad bredvid de hydrauliska kopplingarna (31) mot den första fästdelen (15) och väsentligen parallellt med rotationsaxeln (A) genom motorns (11) rotor (12), och varvid en elektrisk svivel är anordnad att tillhandahålla elektriska signaler och/eller elektriskt energi till det hydrauliska verktyget.

11. Rotatoranordning (10) enligt något av föregående patentkrav, varvid rotatorn vidare innefattar en koppling för ureaanslutning anordnad vänd mot det första fästet (15) och väsentligen parallellt med rotationsaxeln (A), genom motorns (11) rotor (12), och varvid en svivel är anordnad att tillhandahålla urea till det hydrauliska verktyget i anslutning till svivelkopplingen (41)

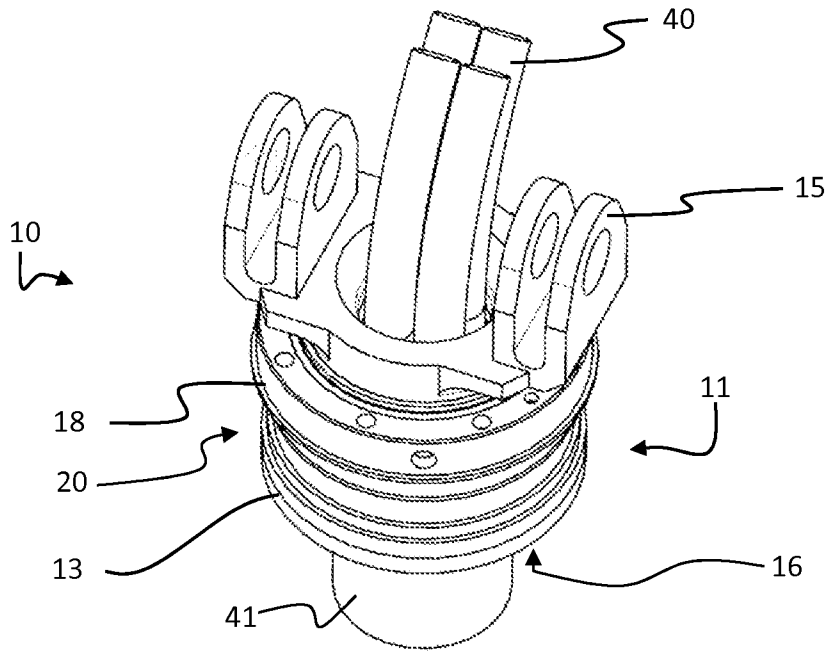


Fig. 1

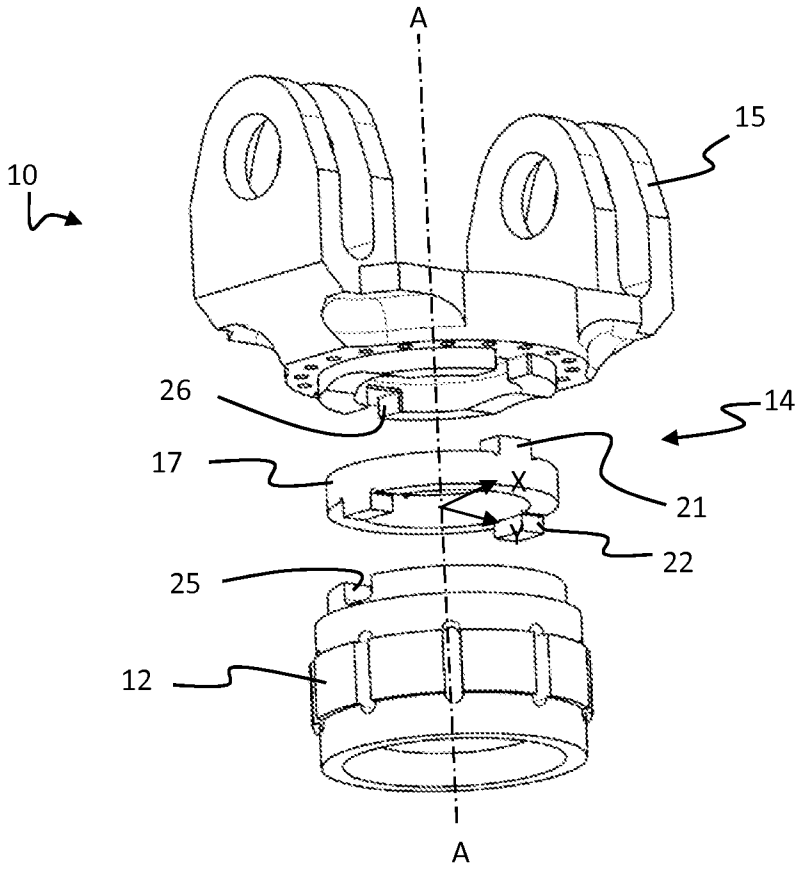


Fig. 2

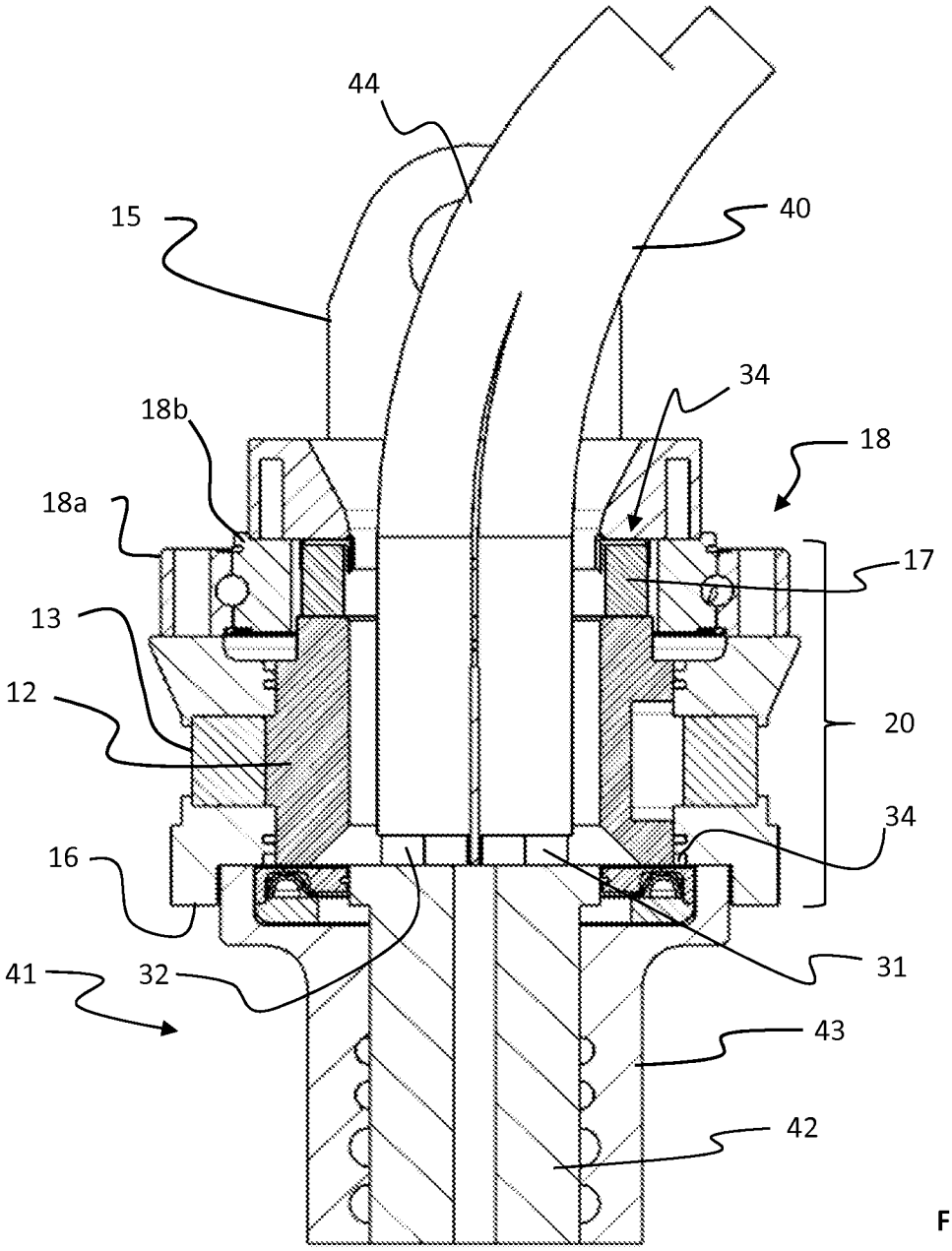


Fig. 3

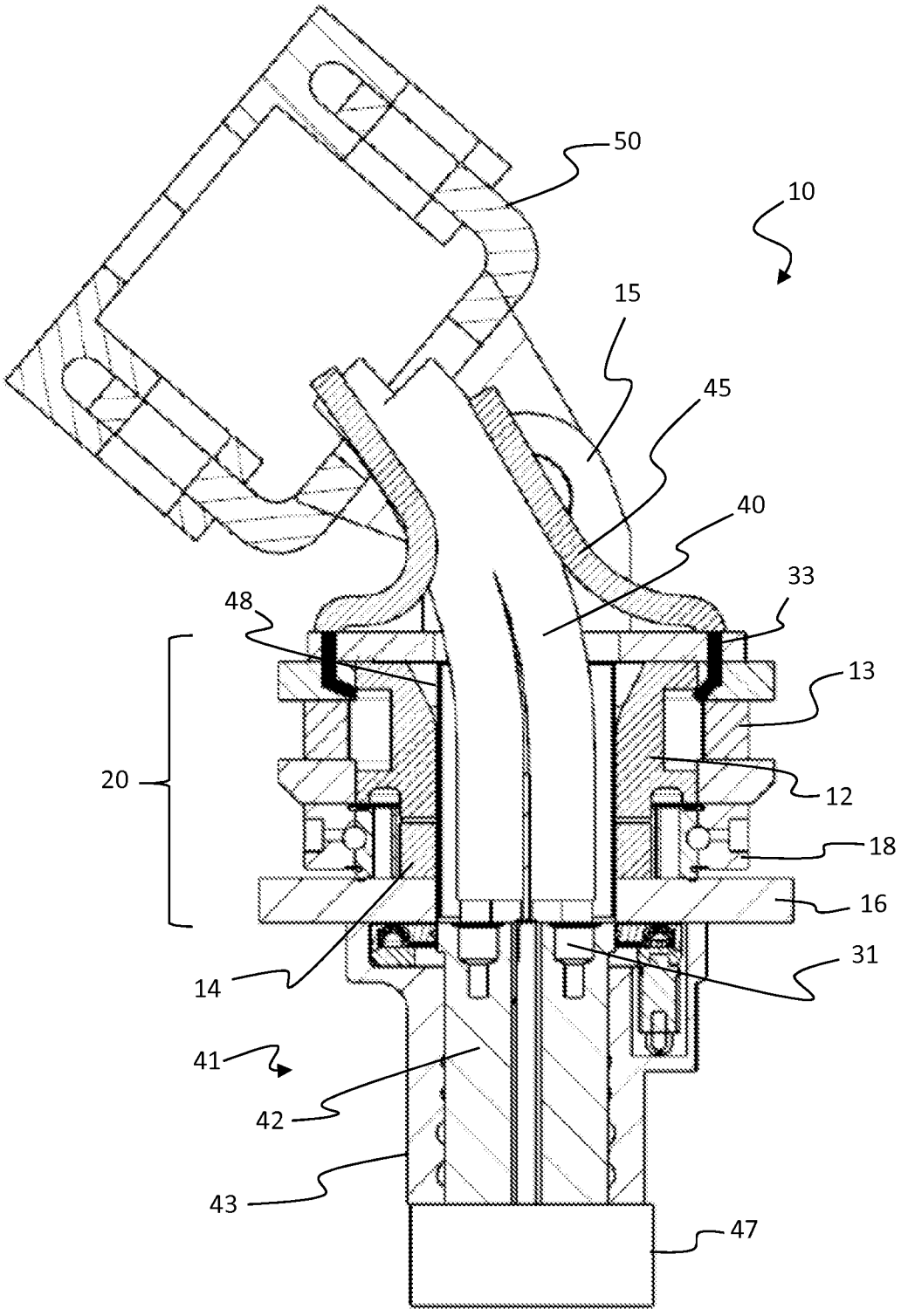


Fig. 4

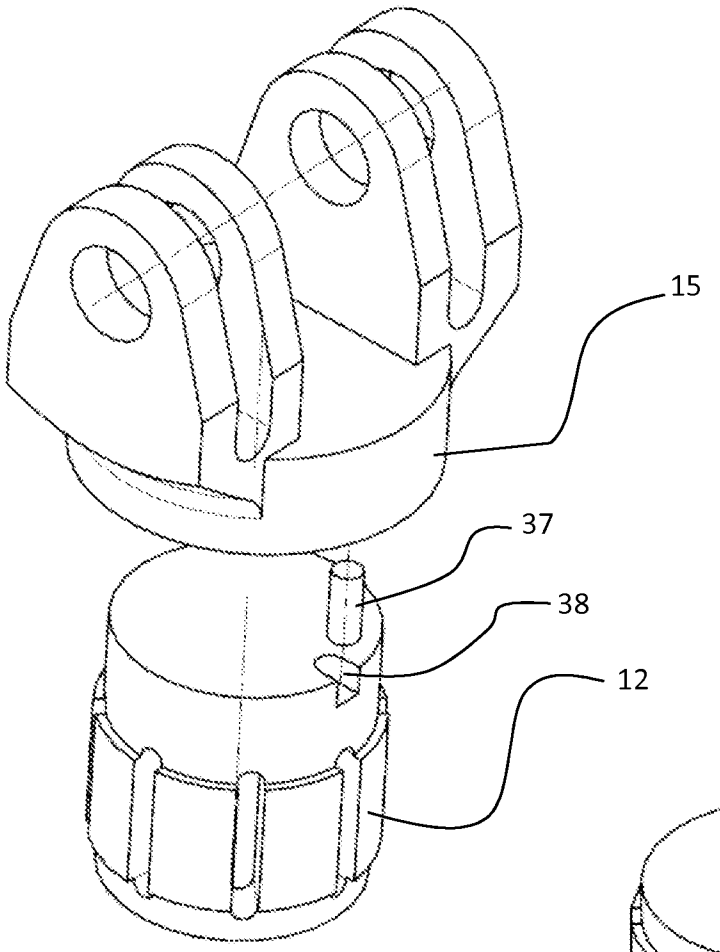


Fig. 5

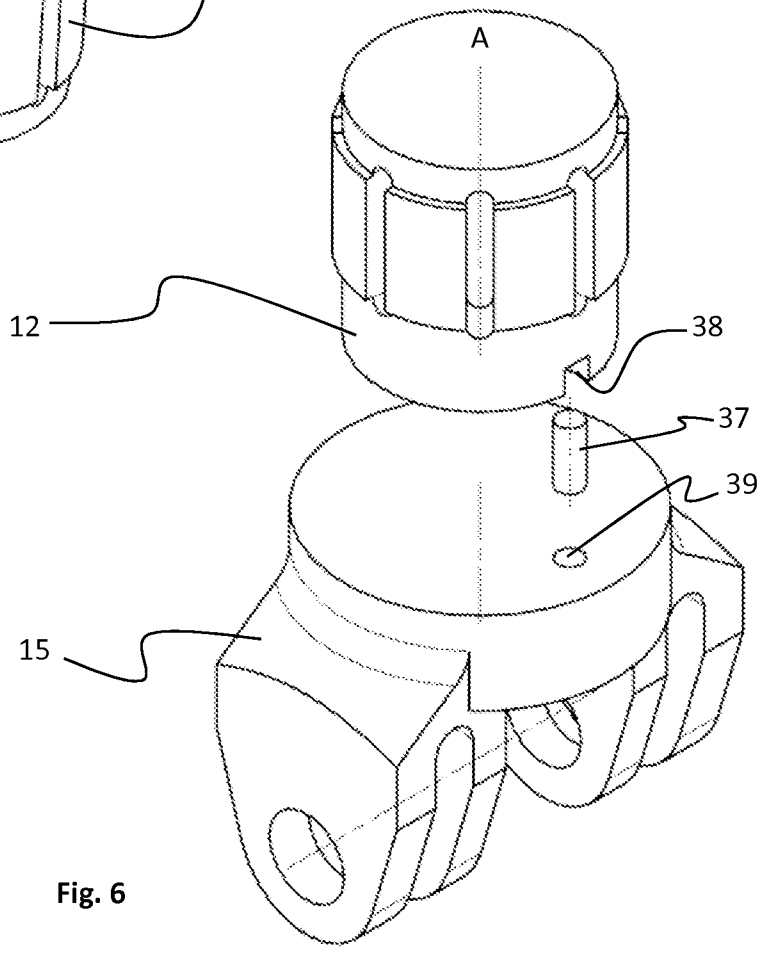


Fig. 6