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(54) **ARRANGEMENT AT A ROTATOR**

ANORDNUNG AN EINER DREHVORRICHTUNG

SYSTEME D'UN ROTATEUR

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Description

[0001] The present invention relates to a rotator arrangement for jib-carried or crane-arm carried working appliances in accordance with the preamble of Claim 1. Such a rotator arrangement is known for example from EP-A-0,080,670.

[0002] Rotators intended for crane-carried working appliances normally include a swivel coupling which enables efficient orientation of hydraulic hoses. The rotator swivel coupling is used to transfer hydraulic medium to the working appliance concerned and/or to rotate the rotator. Unfortunately, the swivel coupling takes-up a relatively large amount of space, meaning that the rotator will be relatively large in height and relatively heavy.

[0003] One object of the present invention is to provide a swivel-equipped rotator which, among other things, is compact, light in weight, and enables hoses to be orientated efficiently in a highly beneficial manner. This object is fulfilled by the invention, having the characteristic features set forth in the accompanying Claims.

[0004] The following advantages are among those afforded by the invention.

[0005] The rotator has a very simple construction, and is compact and light in weight. This latter feature is extremely meaningful, since the weight of the rotator is included in the weight carried by the arm or jib of the working machine. The rotator is very reliable and is subjected to low axial stresses or thrust forces as a result of the design of the swivel arrangement. Another advantage resides in the number of possible alternative hose connections.

[0006] The rotator also affords both technical and economical advantages.

[0007] The invention will now be described in more detail by way of example and with reference to the accompanying drawings, in which **Fig. 1** is a side view of an inventive rotator fitted to the tip of a crane arm and carrying a harvesting unit; **Fig. 2** is a vertical sectioned view of the rotator; **Fig. 3** is a sectioned view of the rotator taken along the line III-III in Fig. 2; and **Figs. 4 and 5** show two further embodiments of the invention.

[0008] Shown in Fig. 1 is a working appliance in the form of a so-called single grip harvesting unit 1 which is suspended from the tip 2 of a machine-carried working arm/crane arm 3 through the medium of a rotator 10. The rotator 10 is suspended from a pivot means 4, which allows the appliance 1 to swing via the tip of the working arm. The rotator 10 enables the appliance 1 to rotate relative to the tip 2 of the working arm. A pair of hydraulic hoses 5 function to supply the rotor 10 with the requisite hydraulic oil, and a number of hydraulic hoses 6 function to supply the appliance 1 with requisite hydraulic oil. Although not shown, the hoses 5,6 are connected to a vehicle-carried source of hydraulic oil.

[0009] As will be seen from Figs. 2 and 3, the rotator 10 comprises a stator 20, which includes an upper stator wall 21, a stator ring 22, and a lower stator wall 23. The

stator walls 21,23 and the stator ring 22 are held together by a number of screws 24.

[0010] The upper stator wall 21 includes two attachment lugs 25 for coupling the rotator to the working arm 3.

[0011] A rotor 30 is mounted within the stator 20. The rotor 30 includes a shaft 31 and is via two radial bearings 32a,32b and via an axial bearing 33 rotatable relative to the stator 20. The illustrated rotator 10 is of the so-called wing type, meaning that spring-biased wings 34 on the rotor 30 together with the inner surface 26 of the stator and the outer surface 35 of the rotor define the working chambers 36,37 required for rotational operation of the rotator. The rotator is able to rotate through several revolutions and its direction of rotation is reversible.

[0012] Pressure medium is supplied to the rotator through hoses 5 connected to connection points 27a,27b which communicate with the working chambers 36,37 of the rotator through the medium of a number of channels. Although only two channels 28,29 are shown in Fig. 3, it will be understood that further channels are provided for the working chambers.

[0013] The rotator has an upper seal 40 and two lower seals 41,42.

[0014] A clamping ring 100 is non-rotatably mounted on the lower end 38 of the rotor shaft 31, said clamping ring 100 supporting the working appliance 1, so that rotational movement of the rotator will be transferred to said appliance.

[0015] The inventive rotator includes a rotor 30, which has at its upper end a swivel device 50 and pressure medium channels connecting therewith. According to an embodiment of the invention, the upper end of the rotor shaft 31 has a circular recess 51, which forms part of the swivel device. The rotor shaft 31 has a first axial channel 52 located in the vicinity of the rotor centre line 53, and a second channel 54 which connects generally radially, or at least partially radially, with the upper recess 51 of the rotor and then detours to a generally axial direction through the rotor shaft 31, as illustrated in Fig. 2. The channel 54 thus has a radial portion 54a and an axial portion 54b.

[0016] In accordance with an embodiment of the invention, the upper stator wall 21 has a downwardly and outwardly protruding central portion 60 which is adapted to fit into the rotor recess 51 essentially with a so-called shape fit. The portion 60 forms a part of the swivel device 50. The central portion 60 is circular and has a circumferentially extending ring groove 61, which communicates with the channel 54 of the rotor shaft 31. A communication channel 62 for pressure medium is provided in the upper stator wall 21 and communicates with the ring groove 61. There is thus obtained permanent communication between the channel 62 and the channel 54, regardless of the rotational position of the rotor 30 relative to the stator 20. A further pressure medium communication channel 63 is provided in the upper stator wall 21, said channel 63 communicating with a cavity 70 between the downwardly and outwardly projecting portion 60 of

the upper stator wall 21 and a bottom surface 71 of the recess 51 in the rotor 30. There is thus obtained constant communication between the channel 63 and the channel 52, regardless of the rotational position of the rotor 30 relative to the stator 20. A number of seals 72-74 are disposed between the outwardly protruding portion 60 and the rotor recess 51, to prevent leakage of pressure medium.

[0017] The rotator 10 of the Fig. 2 embodiment is supplied with pressure medium via the connection points 27a,27b and associated communications channels in the upper stator wall 21, of which only one connection point and one channel have been shown in the figure. In the case of the illustrated embodiment, the connection points 27a,27b are situated on the top surface 21a of the upper stator wall 21. The connection points 76 and 77 of respective channels 62 and 63 are also situated on the top surface 21a of said wall 21. The channel 52 in the rotor 30 has an axial connection point 80 in the lower end 38 of the rotor shaft and also a radial connection point 81 via the clamping ring 100, wherein alternative connection points that are not used are plugged. Similarly, the channel 54 in the rotor 30 has an axial connection point 82 in the lower end 38 of the rotor shaft and a radial connection point 83 via the clamping ring 100, wherein alternative connection points that are not used are plugged. Thus, this embodiment enables all pressure medium supply hoses to be connected to the top surface 21a of the upper stator wall, wherewith the rotator 10 is supplied with pressure medium via the connection points 27a,27b, and the working appliance 1 is supplied with its pressure medium via the connection points 76,77, at the same time as hose communication 7 is, of course, arranged between, e.g., the connection points 80,82 or the connection points 81,83 and the working appliance 1. This embodiment thus provides many beneficial hose orientation options.

[0018] In the case of the embodiment illustrated in Fig. 4, a radial hose connection is provided on the side surface 21b of the stator wall 21. As will be seen, connection points 90a,90b for rotator drive medium and connection points 92,93 for working appliance drive medium are provided on the side surface 21b of the stator wall. The channel configuration in the upper stator wall 21 has, of course, been adapted to the placement of the connection points.

[0019] In the case of the Fig. 5 embodiment, the channel configuration of the upper stator wall 21 is such as to enable the rotator 10 to be supplied with pressure medium either via the connection points 80,82 in the rotor 30 or via the connection points 81,83 in the rotor-carried clamping ring 100. Those connection points that are not used at that particular time are, of course, plugged. Thus, in this embodiment the hose connections are on the rotor 30 or on the clamping ring 100, which both accompany the twisting or rotating movement of the appliance 1. This simplifies orientation of the hoses in the case of construction variations in which the rotator 10 is supplied with pressure medium via the working appliance 1, which

therewith is supplied with pressure medium via hoses 8, for instance. For reasons of a processing/technical nature, end plugs 95 are provided in the channels 96,97 in the upper stator wall 21.

[0020] The presence of the partially radial channel portion 54a in the rotor 30 means that no additional axial force or thrust will occur on the rotator 10 as a result of the supply of pressure medium via the channel 54, which is highly beneficial from the aspect of stress. The medium-conducting channel 54 will preferably be used so as to be pressure-activated when the working appliance 1 is load bearing.

[0021] On the other hand, an additional axial force or thrust will occur in the rotator 10 when pressure medium is supplied via the channel 52 in the rotor 30, due to pressurisation of the space 70. The medium conveying channel 52 will preferably be used so as to be pressure activated when the working appliance 1 is not load bearing. Consequently, the last mentioned additional axial force will have no deleterious effect on the rotator, but will instead enhance the working conditions of the thrust bearing 33. The swivel device 50 includes a shoulder part 98 that has a seal 72,73 on both sides thereof.

[0022] When no additional thrust force is desired from the swivel device 50, the channel system 63,52 can be replaced by a further channel system similar to the channel 62,54 and a further ring groove similar to the ring groove 61.

[0023] When more than two pressure medium transmission points are desired through the swivel device 50, this can be achieved by further channel systems corresponding in principle to the channels 62,54 and a further ring groove corresponding in principle to the ring groove 61.

[0024] It will be understood that the principle according to which the rotator is driven and the structural design of the rotator can be varied widely within the scope of the invention, and that the earlier mentioned wing drive may be replaced, e.g., with many alternative types of rotational drive means.

[0025] A significant advantage provided by the present invention is that the swivel coupling/swivel device 50 is arranged within the rotor/the rotor shaft such as to make possible many different pressure medium connection alternatives, whilst eliminating undesirable thrust additions.

[0026] As will be understood, the configuration of the pressure medium channels may be varied according to requirements and desires within the scope of the inventive concept. The ring groove or ring grooves may also be provided in the end-recess of the rotor shaft.

[0027] The channels 63 and 52 may also be positioned to coincide with the rotor centre line 53. The structural design of the channel 54 and its extension may, of course, be varied, provided that the transition between the channels 62 and 54 will allow the continuous transfer of pressure medium.

[0028] As will be understood, variations can be applied

to the inventive arrangement, by replacing the described components with functionally equivalent components.

[0029] Thus, the invention is not restricted to the illustrated and described embodiments thereof, since modifications and variations are possible within the scope of the accompanying Claims.

Claims

1. A rotator, particularly intended for arm-carried working appliances, wherein the rotator (10) includes a stator (20), a rotor (30) having a shaft (31) and a swivel coupling/swivel device (50) for the transfer of working pressure medium between stator (20) and rotor (30) when in use, and wherein the swivel device (50) is arranged within the rotor (30), **characterised in that** said rotor shaft (31) includes at least one medium transfer channel (54) that connects at least partially radially with a recess (51) in the rotor shaft (31).
2. A rotator according to Claim 1, **characterised in that** the stator (20) carries an outwardly projecting portion (60) that forms a part of the swivel device (50).
3. A rotator according to Claim 1 or 2, **characterised in that** the rotor shaft (31) includes a recess (51) which forms part of the swivel device (50).
4. A rotator according to any one of Claims 1-3, **characterised in that** the rotor shaft (31) includes a channel (52) that connects generally axially with the recess (51) in the rotor shaft (31).
5. A rotator according to any one of Claims 2-4, **characterised in that** the outwardly projecting portion (60) of the stator (20) and/or the rotor shaft (31) includes at least one ring groove (61) for co-action with one (54) of the rotor shaft channels.
6. A rotator according to any one of Claims 1-5, **characterised in that** the rotor shaft (31) includes a channel (54) which has a generally radial part (54a) and a generally axial part (54b).
7. A rotator according to any one of Claims 1-6, **characterised in that** the rotor shaft (31) includes a generally axial channel (52) which extends from a bottom surface (71) of the recess (51) in the rotor shaft (31) to a lower end (38) of said rotor shaft.
8. A rotator according to any one of Claims 4-7, **characterised in that** the rotor shaft channels (52,54) extend to connection points (80,82) in a lower end surface (38) of the rotor shaft (31) and/or to radial connection points (81,83) in a clamping ring (100)

on the rotor shaft.

9. A rotator according to any one of Claims 2-8, **characterised by** a gap or a space (70) between a bottom surface of the downwardly projecting portion (60) of the stator (20) and a bottom surface (71) of the rotor shaft recess (51).
10. A rotator according to any one of Claims 1-9, **characterised in that** an upper stator wall (21) includes connection points (76,77) and/or channels (62,63) that communicate with the channels (52,54) of the rotor shaft (31).

Patentansprüche

1. Dreheinrichtung, im Besonderen für arm-gestützte Arbeitseinrichtungen, wobei die Dreheinrichtung (10) einen Stator (20), einen Rotor (30) mit einer Welle (31) und eine Drehkupplung/Drehvorrichtung (50) zur Übertragung des Arbeitsdrucksmittels zwischen dem Stator (20) und dem Rotor (30) im Einsatz aufweist, und wobei die Drehvorrichtung (50) in dem Rotor (30) angeordnet ist, **dadurch gekennzeichnet, dass** die Rotorwelle (31) wenigstens einen Mittelübertragungskanal (54) enthält, der wenigstens teilweise radial mit einer Aussparung (51) in der Rotorwelle (31) verbunden ist.
2. Dreheinrichtung gemäß Anspruch 1, **dadurch gekennzeichnet, dass** der Stator (20) ein nach außen hervorstehendes Teil (60) trägt, das einen Teil der Drehvorrichtung (50) bildet.
3. Dreheinrichtung gemäß Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Rotorwelle (31) eine Aussparung (51) enthält, die einen Teil der Drehvorrichtung (50) bildet.
4. Dreheinrichtung gemäß einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** die Rotorwelle (31) einen Kanal (52) enthält, der allgemein axial mit der Aussparung (51) in der Rotorwelle (31) verbunden ist.
5. Dreheinrichtung gemäß einem der Ansprüche 2 bis 4, **dadurch gekennzeichnet, dass** das nach außen hervorstehende Teil (60) des Stators (20) und/oder der Rotorwelle (31) wenigstens eine Ringnut (61) zum Zusammenwirken mit einem (54) der Rotorwellenkanäle enthält.
6. Drehvorrichtung gemäß einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet, dass** die Rotorwelle (31) einen Kanal (54) enthält, der ein allgemein axiales Teil (54a) und ein im Allgemeinen axiales Teil

(54b) aufweist.

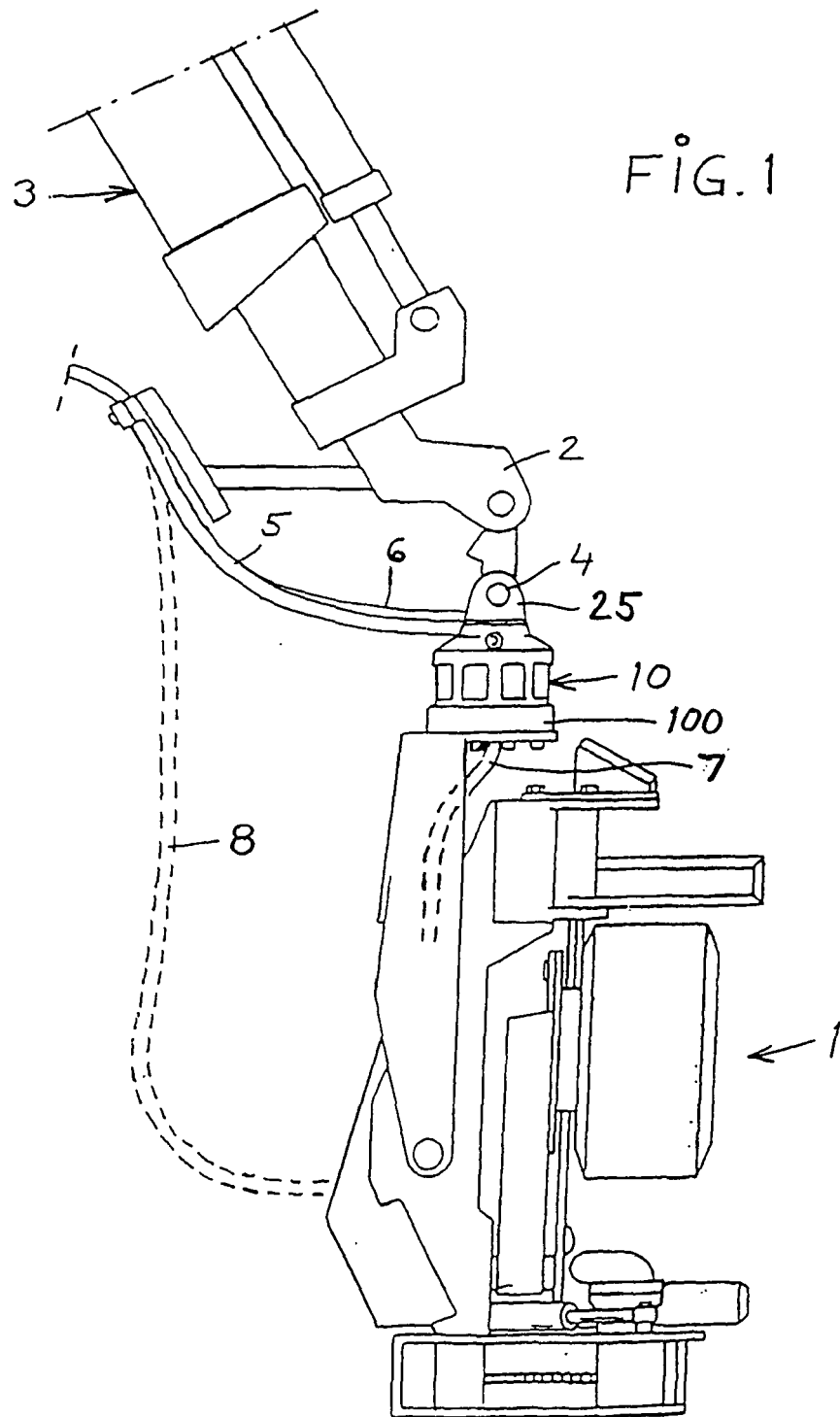
7. Drehvorrichtung gemäß einem der Ansprüche 1 bis 6, **dadurch gekennzeichnet, dass** die Rotorwelle (31) einen allgemein axialen Kanal (52) enthält, der sich von der Bodenfläche (71) der Aussparung (51) in der Rotorwelle (31) zu einem unteren Ende (38) der Rotorwelle erstreckt.
8. Dreheinrichtung gemäß einem der Ansprüche 4 bis 7, **dadurch gekennzeichnet, dass** die Rotorwellenkanäle (52, 54) sich zu den Verbindungspunkten (80, 82) in einer unteren Endseite (38) der Rotorwelle (31) und/oder zu radialen Verbindungspunkten (81, 83) in einem Klemmring (100) auf der Rotorwelle erstrecken.
9. Dreheinrichtung gemäß einem der Ansprüche 2 bis 8, **gekennzeichnet durch** eine Lücke oder einen Freiraum (70) zwischen einer Bodenfläche des nach unten hervorstehenden Teils (60) des Stators (20) und einer Bodenfläche (71) der Rotorwellenaussparung (51).
10. Dreheinrichtung gemäß einem der Ansprüche 1 bis 9, **dadurch gekennzeichnet, dass** eine obere Statorwand (21) Verbindungspunkte (76, 77) und/oder Kanäle (62, 63) enthält, die mit den Kanälen (52, 54) der Rotorwelle (31) in Verbindung stehen.

Revendications

1. Rotateur, destiné notamment à des appareils de travail monté sur bras, le rotateur (10) incluant un stator (20), un rotor (30) qui comporte un arbre (31) et un dispositif pivotant ou de couplage pivotant (50) pour transférer, en utilisation, un fluide de travail sous pression entre le stator (20) et le rotor (30), le dispositif pivotant (50) étant disposé à l'intérieur du rotor (30), **caractérisé en ce que** l'arbre (31) du rotor inclut au moins un canal de transfert de fluide (54) qui est raccordé au moins en partie radialement à un évidement (51) ménagé dans l'arbre (31) du rotor.
2. Rotateur selon la revendication 1, **caractérisé en ce que** le stator (20) supporte une portion (60), saillant vers l'extérieur, qui forme une partie du dispositif pivotant (50).
3. Stator selon la revendication 1 ou 2, **caractérisé en ce que** l'arbre (31) du rotor inclut un évidement (51) qui forme une partie du dispositif pivotant (50).
4. Rotateur selon l'une quelconque des revendications 1 à 3, **caractérisé en ce que** l'arbre (31) du rotor inclut un canal (52) qui se raccorde, généralement axialement, à l'évidement (51) ménagé dans l'arbre

(31) du rotor.

5. Rotateur selon l'une quelconque des revendications 2 à 4, **caractérisé en ce que** la portion (60), saillant vers l'extérieur, du stator (20) et/ou l'arbre (31) du rotor inclut au moins une gorge annulaire (61) destinée à coopérer avec l'un (54) des canaux de l'arbre du rotor.
6. Rotateur selon l'une quelconque des revendications 1 à 5, **caractérisé en ce que** l'arbre (31) du rotor inclut un canal (54) qui comporte une partie (54a) qui s'étend d'une façon générale radialement et une partie (54b) qui s'étend d'une façon générale axialement.
7. Rotateur selon l'une quelconque des revendications 1 à 6, **caractérisé en ce que** l'arbre (31) du rotor inclut un canal (52) qui s'étend d'une façon générale axialement d'une surface de fond (71) de l'évidement (51) ménagé dans l'arbre (31) du rotor à une extrémité inférieure (38) dudit arbre du rotor.
8. Rotateur selon l'une quelconque des revendications 4 à 7, **caractérisé en ce que** les canaux (52, 54) de l'arbre du rotor s'étendent vers des points de raccordement (80, 82) dans une surface d'extrémité inférieure (38) de l'arbre (31) du rotor et/ou vers des points de raccordement radiaux (81, 83) dans une bague de serrage (100) sur l'arbre du rotor.
9. Rotateur sur le l'une quelconque des revendications 2 à 8, **caractérisé par** un interstice ou un espace (70) ménagé entre une surface de fond de la portion (60), s'étendant vers le bas, du stator (20) et une surface de fond (71) de l'évidement (51) de l'arbre du rotor.
10. Rotateur lors selon l'une quelconque des revendications 1 à 9, **caractérisé en ce qu'**une paroi supérieure (21) du stator inclut des points de raccordement (76, 77) et/ou des canaux (62, 63) qui communiquent avec les canaux (52, 54) de l'arbre du rotor (31).



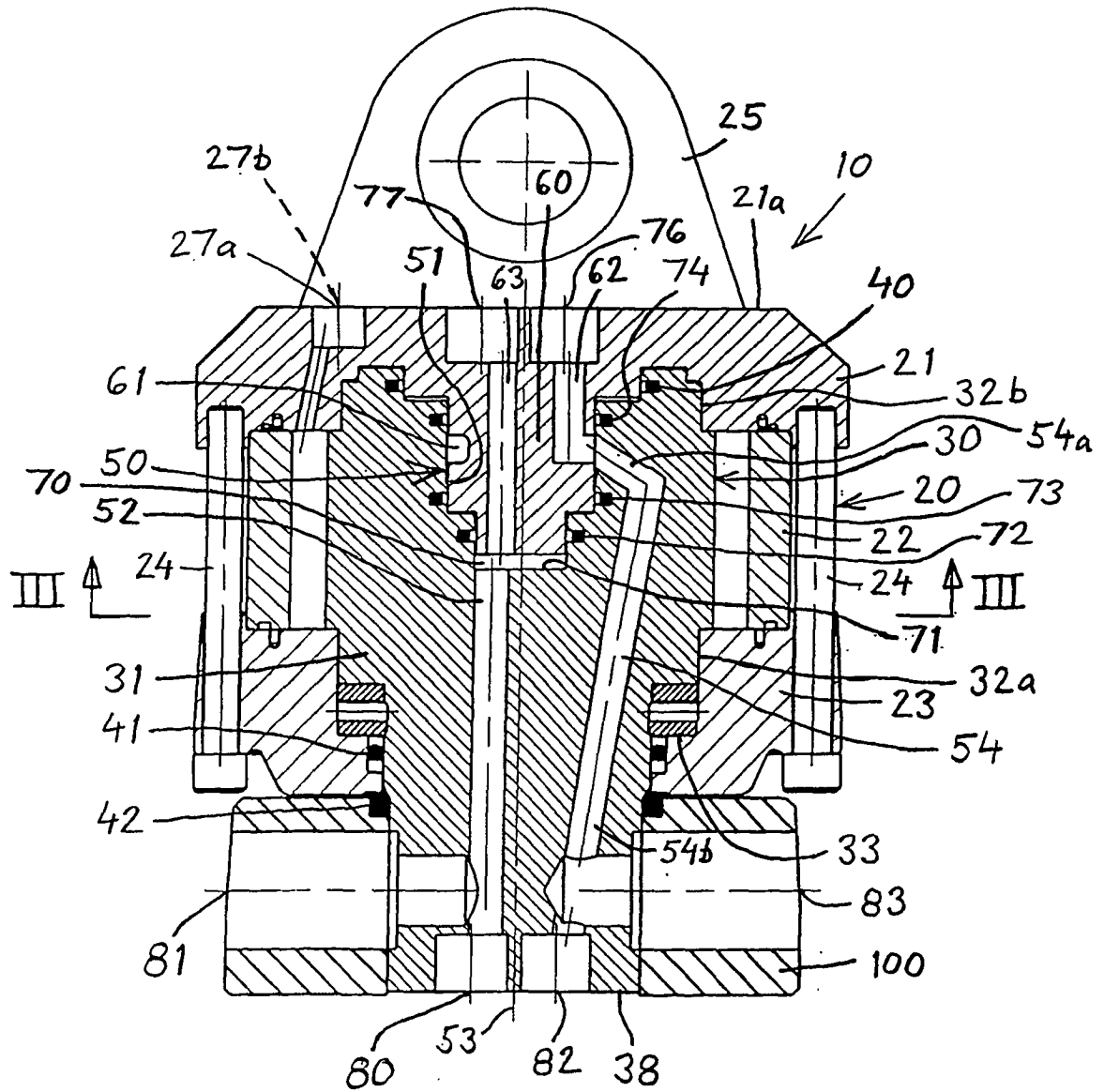


FIG. 2

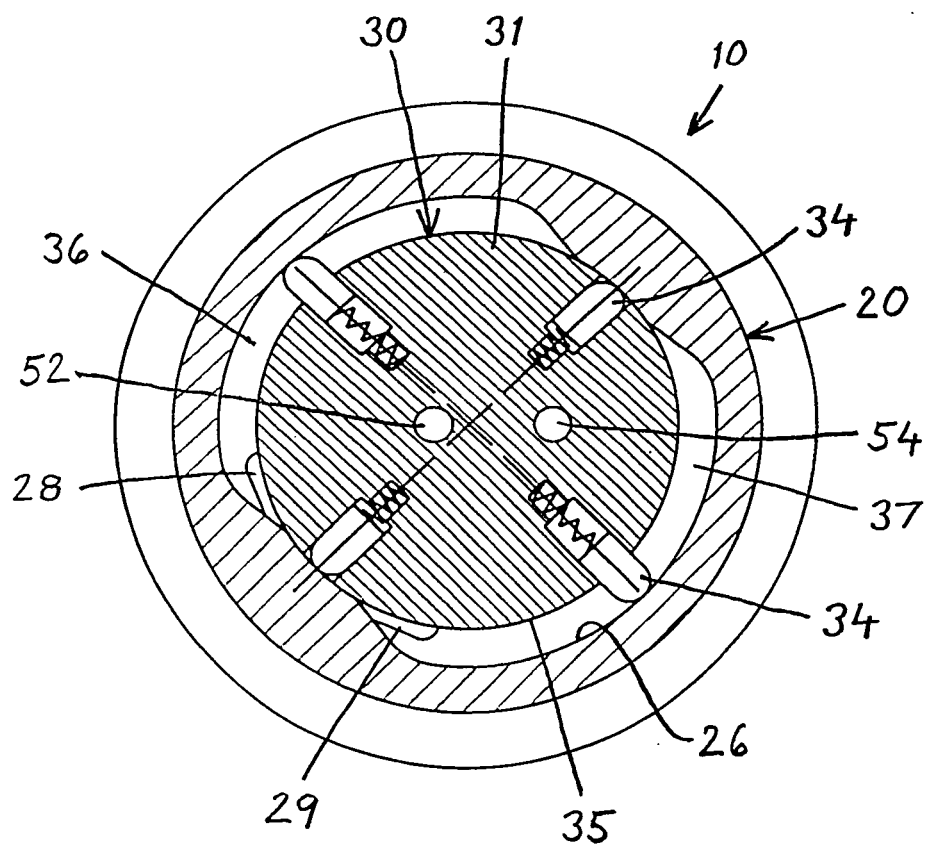


FIG. 3

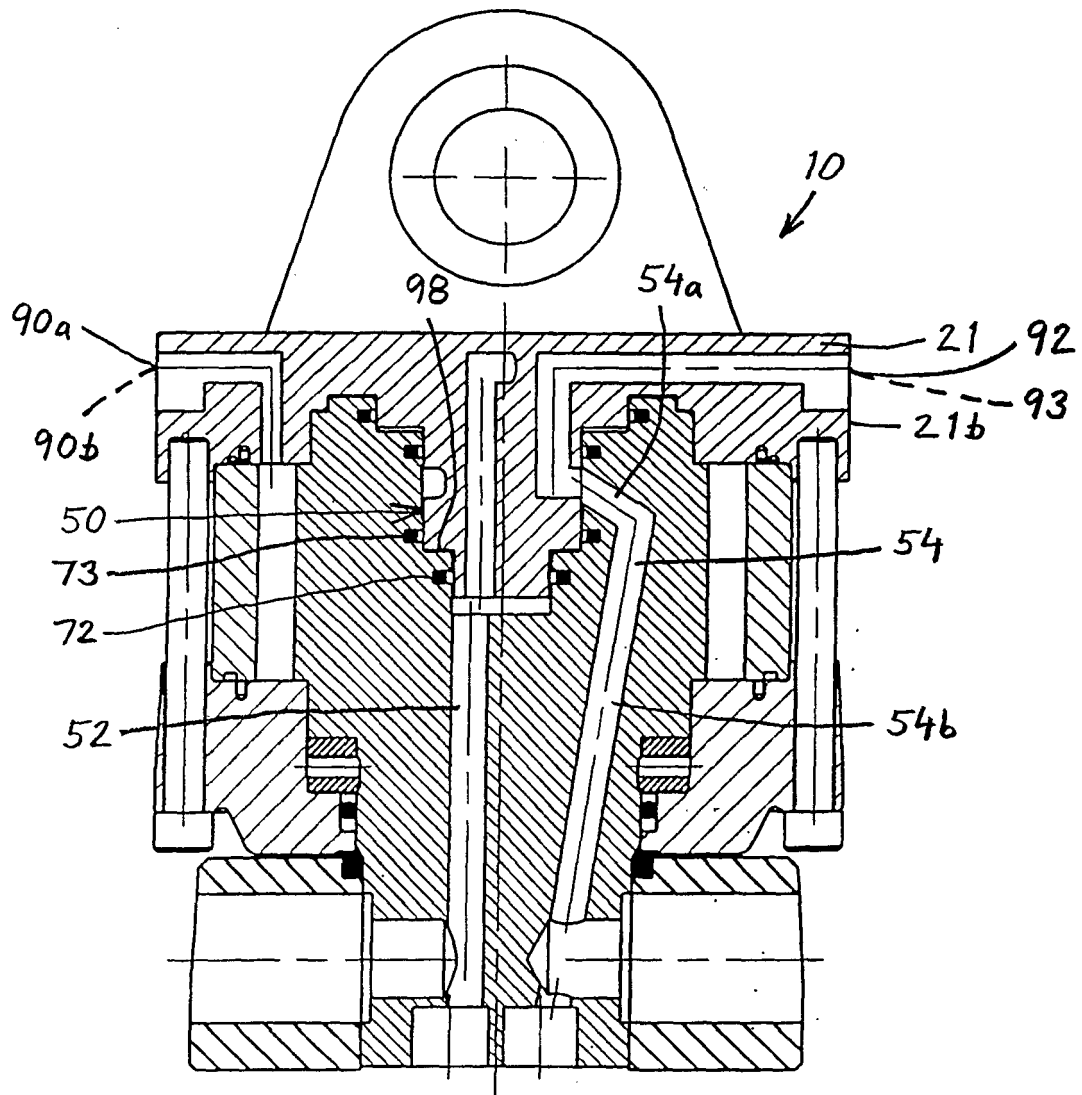


FIG. 4

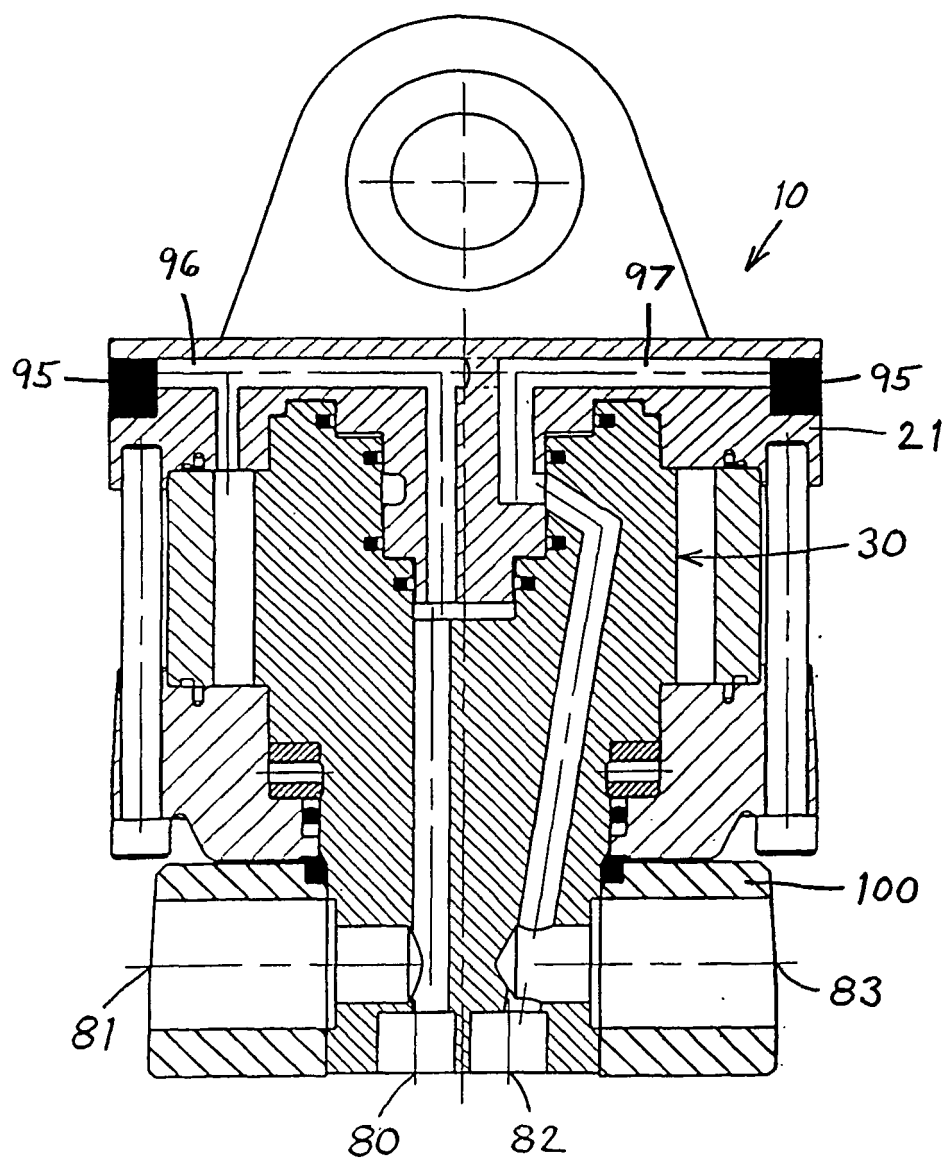


FIG. 5

REFERENCES CITED IN THE DESCRIPTION

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