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(54) DEVICE RELATED TO A WORKING ARM

VORRICHTUNG IM ZUSAMMENHANG MIT EINEM ARBEITSARM

DISPOSITIF ASSOCIÉ À UN BRAS DE TRAVAIL

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Description

Technical field

[0001] The present invention refers to a device to be mounted to a working arm in accordance with Claim 1.

Background of the invention

[0002] A rotation device and a tilting device are frequently used in various types of machines, for example, digging machines, provided with a working arm in order to achieve the desired movability in a working tool. It is therefore desirable to make possible a hydraulic as well as an electrical connection for making possible a hydraulic supply and electrical supply to the components exposed to tilting and rotation in spite of the rotation and tilting. For example, in forest machines and woodworking machines a manoeuvring device is normally used that comprises a rotation device (rotator) but lacks a tilting device.

[0003] WO 2009/085825 A1 which forms the basis for the preamble of claim 1, discloses a rotation device to which a tool may be attached. WO 2009/035392 A1 discloses an apparatus for driving down or pulling up elongated objects. US 5 908 060 discloses a tree processing machine having a processing head rotatably connected to the end of a boom.

Object of the invention

[0004] An object of the present invention is to make available an extremely advantageous solution for the supplying of electricity and therewith also of signals to components that participate in the movements of rotation and possibly of tilting.

Advantages of the invention

[0005] Among the many advantages of the invention the following can be mentioned, among others. The invention makes possible an equipping with transmitters and sensors that increase safety and also the capacity. The invention has both technical and economic advantages.

Short description of the drawings

[0006]

Figure 1 shows a perspective view of a digging machine/excavator that carries a rotation- and tilting device.

Figure 2 shows a partially exploded perspective view obliquely from the top of the main parts in the rotation- and tilting device.

Figure 3 shows a perspective view obliquely from the bottom of the rotation- and tilting device.

Figure 4 shows a partially exploded perspective view obliquely from the bottom of a hydraulic swivel and an electrical swivel.

Figure 5 shows a schematic vertical section through an alternative embodiment in a rotation device (rotator).

Detailed description of the exemplary embodiment shown

[0007] Figure 1 shows a digging machine 1 whose working arm or shaft 2 carries an upper holder 10A for mounting of a manoeuvring device 15 that comprises a combined rotation device 20 and tilting device 30. The manoeuvring device 15 comprises an upper holder 10B for a firm cooperation with the upper holder 10A in the working arm 2. The manoeuvring arrangement 15 comprises a lower holder 16A for a firm cooperation with a holder 16B in a working tool that consists of a digging bucket 5 in the case shown.

[0008] The rotation arrangement 20 comprises a stator part 21 that is mounted in a non-turning manner via the upper holder 10B in the working arm 2 of the digging machine 1 via the upper holder 10A. Furthermore, the rotation device 20 comprises a rotor part 25 that is mounted in a non-turning manner via the lower holder 16A to the holder 16B of the working tool 5.

[0009] The rotor part 25 comprises a worm wheel 26 and a worm screw 27 that are rotationally driven in a reversible manner by a hydraulic motor 28 in the desired direction of rotation, which means that the working tool 5 can be rotated to optional working positions.

[0010] The stator part 21 is suspended in a rockable/tiltable manner relative to the upper holder 10B via two hinges 22, whereby the tilting movement is brought about by two hydraulic cylinders 24 that operate between the hinges 22 and the upper holder 10B, where the tilting cylinders 24 are anchored at fastening points 11 located on both sides of the holder 10B. A desired manoeuvring of the tilting cylinders 24 can bring about optional inclined positions/tilting positions for the stator part 21 and the rotor part 25 mounted on the latter and therewith also for the working tool 5. The rocking/tilting take place around the hinges 22.

[0011] It is apparent from the above that the manoeuvring device 15 offers optional combinations of the positions of rotation and of tilting for the actual working tool, which is naturally very advantageous for, for example, various types of ground working.

[0012] In addition to normal hydraulic connections and valves (not shown), a hydraulic swivel 50 is centrally arranged for pressure medium communication (hydraulic communication) with the rotatable lower holder 16A and the working tool when it requires hydraulics. The centre part 51 of the swivel 50 is arranged in a non-turning manner relative to the stator part 21 and the outer part 52 of the swivel 50 is arranged in a non-turning manner relative to the rotor part 25 so that the outer part 52 follows the

rotational movement of the rotor part 25 and of the working tool. An example of a swivel-dependent hydraulic connection 28 that follows the rotation is shown in figure 2.

[0013] The hydraulic swivel 50 also makes possible a hydraulic manoeuvring of components at the lower holder 16A so that a hydraulic-based locking of the working tool 5 to the lower holder 16A can be carried out. This is most clearly apparent in figure 3, where a double-action hydraulic cylinder 33 shifts a locking plate 34 in such a manner that the working tool 5 becomes locked/fixed relative to the lower holder 16A, whereby fastening pins 7,8 at the working tools holder 16B are fixed in recesses 35-38 at the lower holder 16A.

[0014] According to the invention an electrical swivel 60 is arranged at the centre part 51 of the hydraulic swivel 50, whereby the outer part 61 of the electrical swivel 60 is fixed in a non-turning manner to the central part 51 by screws 65 that engage threaded holes 66 in the centre part 51. The middle part 62 of the electrical swivel 60 is rotatable relative to the outer part 61. The centre part 51 comprises a through axial hole 55 of such a size that a section 63 of the outer part 61 of the electrical swivel 60 can be housed in this hole 55. Electrical lines 70 or signal lines running to the outer part 61 of the electrical swivel 60 extend from an original source and via the hole 55 to the connection to the outer part 61 of the electrical swivel 60. Electrical lines 71 or signal lines running from the middle part 62 of the electrical swivel 60 have an electrical communication/signal communication maintained with lines 70, whereby the presence of the electrical swivel eliminates the turning (twisting) of the electrical lines/signal lines 70,71 when the rotation device 20 exerts a rotational movement in order to turn or rotate the working tool 5. A combined rotation and tilting also does not cause any problems as concerns the function of the electrical swivel. The electrical swivel participates in the tilting movement.

[0015] The electrical swivel 60 can also be placed, if desired, at an upper end of the hydraulic swivel 50. A certain eccentric placing is also possible.

[0016] According to the invention sensors are arranged at the lower holder 16A in order to verify a correct rigid coupling of a working tool 5. The sensors communicate via lines 70,71 with, for example, a display in an operator's cabin so that an operator obtains continuous information about whether the working tool is correctly rigidly set. An alarm can be arranged in order to further increase safety. The electrical swivel 60 also makes it possible that corresponding sensor equipment can be arranged on the parts following the rotation, for example, for verifications and controls, etc.

[0017] The electrical swivel 60 also makes it possible to equip the working tool 5 itself with sensors in order to transmit relevant information via lines 70,71 to the vehicle operator.

[0018] The required connectors for setting up the required line communication can simply be arranged on

the holder 16A and 16B so that an automatic line coupling takes place upon the rigid coupling of the working tool 5.

[0019] The invention also makes possible the placing of illumination devices on the lower holder 16A or directly on the working tools so that the illumination always follows the movement patterns of the working tool, which brings about an excellent working illumination for the operator.

[0020] According to the invention it is also possible to place, for example, tilting sensors and other position indicators directly on the working tool 5 or on the lower holder 16A.

[0021] The electrical swivel 60 also makes possible the use of, for example, electrical valves, electrically controlled hydraulic valves and electrical adjusting tools on rotating and tilting parts, which makes possible, for example, an electrical locking of the working tool.

[0022] Fig. 5 shows an alternative rotation device 220 that comprises a rotator 110 whose construction concept is built on a so-called hydraulically driven wing motor. The rotator 110 comprises a stator part 120 that is normally connected to a working arm and comprises a rotor part 130 that is normally connected to a working tool. The stator part 120 comprises a projecting swivel part 160 that cooperates with a recess 151 in the rotor shaft 131 so that a swivel device 150 for transmitting media is obtained. As a result, for example, the working tool obtains its hydraulic oil supply via groove 161 and conduits 154 in swivel device 150. According to the invention an electrical swivel 260 is arranged at the lower end of the swivel part 160 in an area inside the hydraulic motor/the rotation device/the rotator 110. Lines connected to the electrical swivel 260 are designated by 170 and 171. However, it can be seen that the placing of the electrical swivel 260 can vary based on the formation of the constructive details.

[0023] The rotation device 220 shown in fig. 5 is suitable, among other things, for being used with working arms in forest machines and woodworking machines where the working tool is flexibly suspended and where a tilting device is normally not integrated.

[0024] It can be seen that the above-described rotation devices 20 and 220 only constitute examples of suitable embodiments that comprise electrical swivels 60,260 and it can therefore be seen that the invention can be varied in many different ways above and beyond that which was described above. The tilting device can be included or excluded depending on the desired goal as concerns the capacity for movement of the manoeuvring device.

[0025] It can be seen that many variations and applications are possible within the framework for the above-described inventive concept.

[0026] The invention is therefore not limited to that which was shown and described but rather changes and modifications are thus possible within the scope of the following claims.

Claims

1. A device arranged to be mounted to a working arm of a digging machine, forest machine, woodworking machine or the like, in whose free end a manoeuvring device (15) is carried, whereby the manoeuvring device (15) comprises a rotation device (20) in order to exert a movement of rotation on a working tool (5) a lower holder (16A) being arranged on the manoeuvring device (15) for firm cooperation with a holder (16B) on said working tool (5), wherein the device comprises an electrical swivel (60) whose one end (62) follows the rotational movement of the rotation device (20), **characterized in that** sensors are arranged at the lower holder (16A) to verify a correct rigid coupling of the working tool (5), said sensors communicating via lines (70,71) connected to the electrical swivel (60).
2. The device according to Claim 1, **characterized in that** the manoeuvring device (15) comprises a tilting device (30) for exerting a tilting movement on the working tool (5), and that the electrical swivel (60) follows the tilting movement.
3. The device according to Claim 1 or 2, **characterized in that** the arrangement comprises a hydraulic swivel (50) in whose central area the electrical swivel (60) is arranged.
4. The device according to Claim 3, **characterized in that** the hydraulic swivel (50) is integrated with the rotation device (20).

Patentansprüche

1. Vorrichtung, die zum Anbringen an einem Arbeitsarm einer Baggermaschine, Forstmaschine, Holzbearbeitungsmaschine oder dergleichen, an dessen freien Ende eine Manövrier Vorrichtung (15) getragen wird, angeordnet ist, wobei die Manövrier Vorrichtung (15) eine Drehvorrichtung (20) umfasst, um ein Arbeitswerkzeug (5) mit einer Drehbewegung zu beaufschlagen, wobei ein unterer Halter (16A) an der Manövrier Vorrichtung (15) zum festen Zusammenwirken mit einem Halter (16B) an dem Arbeitswerkzeug (5) angeordnet ist, wobei die Vorrichtung eine elektrische Schwenkeinheit (60) umfasst, deren eines Ende (62) der Drehbewegung der Drehvorrichtung (20) folgt, **dadurch gekennzeichnet, dass** Sensoren am unteren Halter (16A) angeordnet sind, um eine ordnungsgemäße starre Kopplung des Arbeitswerkzeugs (5) zu überprüfen, wobei die Sensoren über mit der elektrischen Schwenkeinheit (60) verbundene Leitungen (70, 71) kommunizieren.
2. Vorrichtung nach Anspruch 1, **dadurch gekenn-**

zeichnet, dass die Manövrier Vorrichtung (15) eine Kippvorrichtung (30) zum Beaufschlagen des Arbeitswerkzeugs (5) mit einer Kippbewegung umfasst, und dass die elektrische Schwenkeinheit (60) der Kippbewegung folgt.

3. Vorrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Anordnung eine hydraulische Schwenkeinheit (50) umfasst, in deren mittleren Bereich die elektrische Schwenkeinheit (60) angeordnet ist.
4. Vorrichtung nach Anspruch 3, **dadurch gekennzeichnet, dass** die hydraulische Schwenkeinheit (50) mit der Drehvorrichtung (20) integriert ist.

Revendications

1. Dispositif prévu pour être monté sur un bras de travail d'une excavatrice, d'un engin forestier, d'une machine de travail du bois ou similaire, à l'extrémité libre duquel est porté un dispositif de manœuvre (15), le dispositif de manœuvre (15) comprenant un dispositif de rotation (20) pour exercer un mouvement de rotation sur un outil de travail (5), un support inférieur (16A) étant disposé sur le dispositif de manœuvre (15) en vue d'une coopération ferme avec un support (16B) sur ledit outil de travail (5), le dispositif comprenant un pivot électrique (60) dont une extrémité (62) suit le mouvement de rotation du dispositif de rotation (20), **caractérisé en ce que** des capteurs sont disposés au niveau du support inférieur (16A) pour vérifier un accouplement rigide correct de l'outil de travail (5), lesdits capteurs communiquant par le biais de lignes (70, 71) connectées au pivot électrique (60).
2. Dispositif selon la revendication 1, **caractérisé en ce que** le dispositif de manœuvre (15) comprend un dispositif de basculement (30) pour exercer un mouvement de basculement sur l'outil de travail (5), et **en ce que** le pivot électrique (60) suit le mouvement de basculement.
3. Dispositif selon la revendication 1 ou 2, **caractérisé en ce que** l'agencement comprend un pivot hydraulique (50) dans la zone centrale duquel est disposé le pivot électrique (60).
4. Dispositif selon la revendication 3, **caractérisé en ce que** le pivot hydraulique (50) est intégré au dispositif de rotation (20).

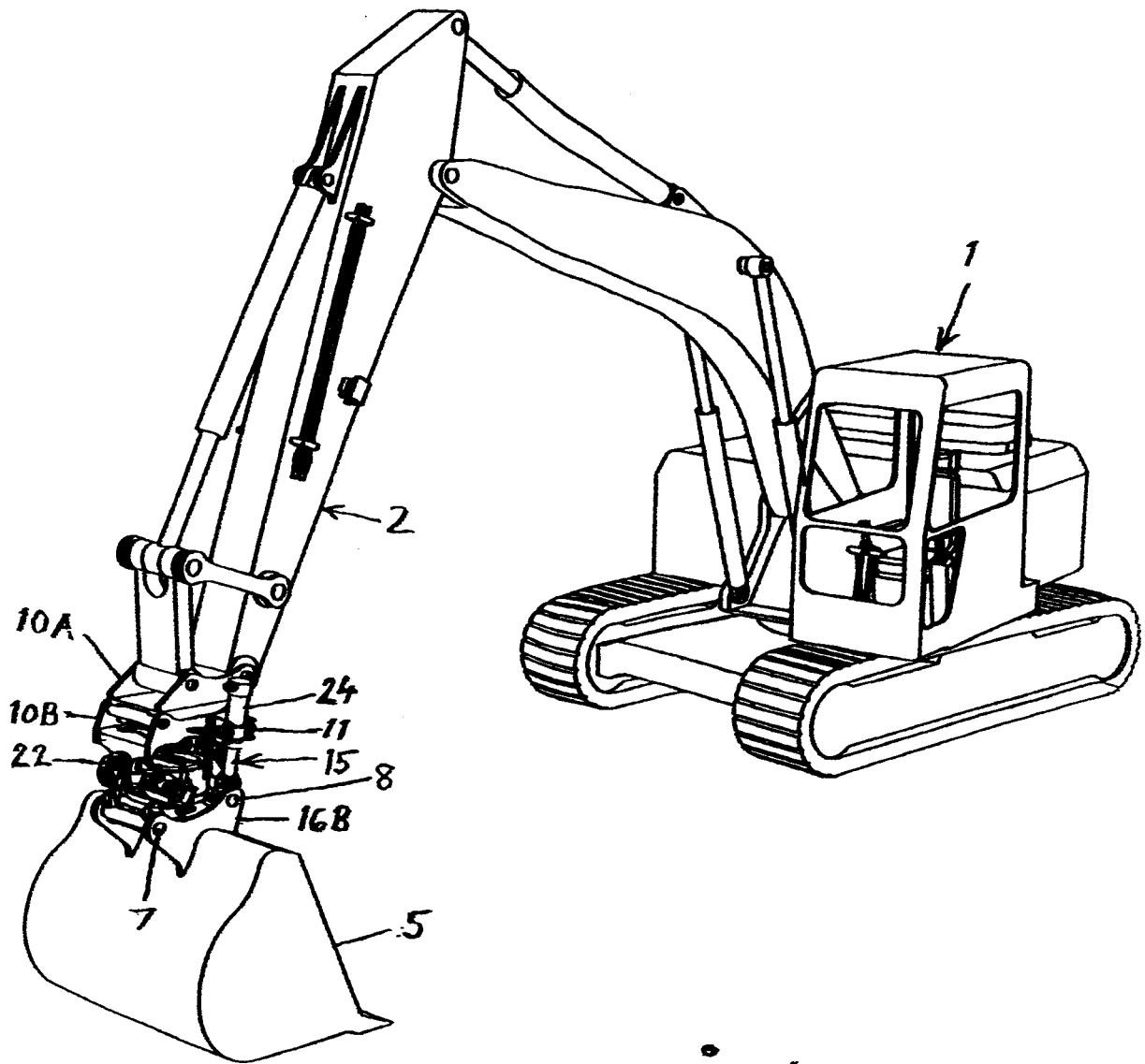


FIG. 1

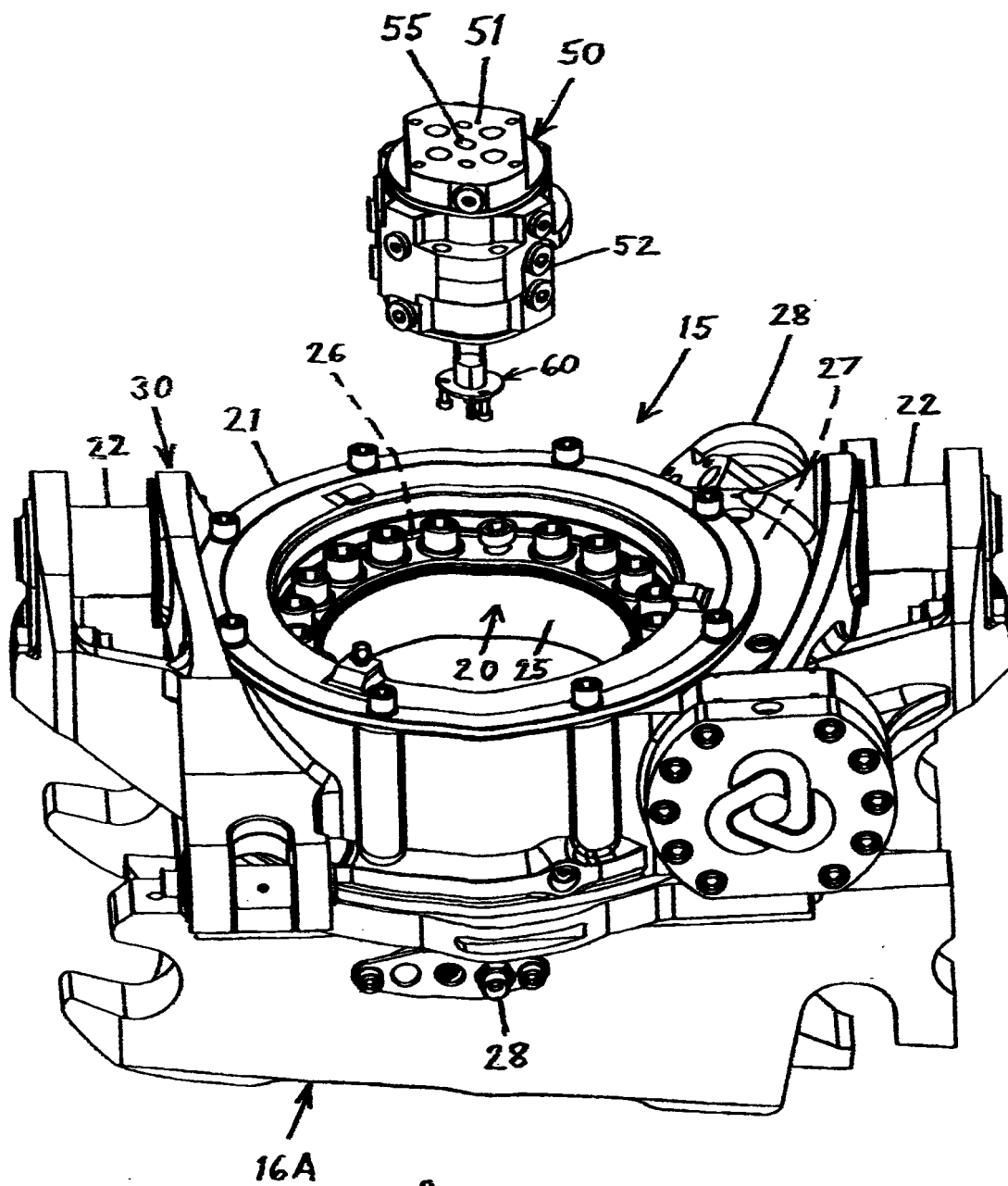


FIG. 2

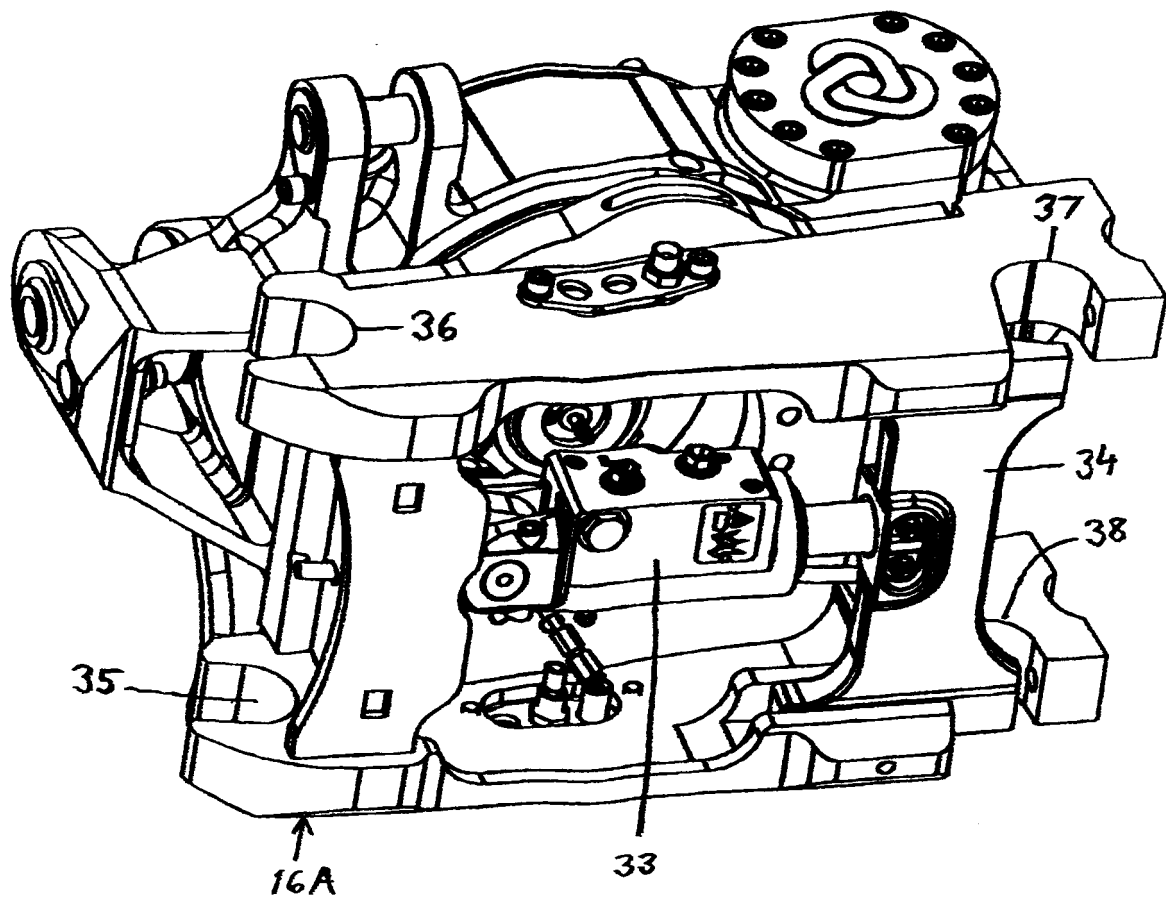


FIG. 3

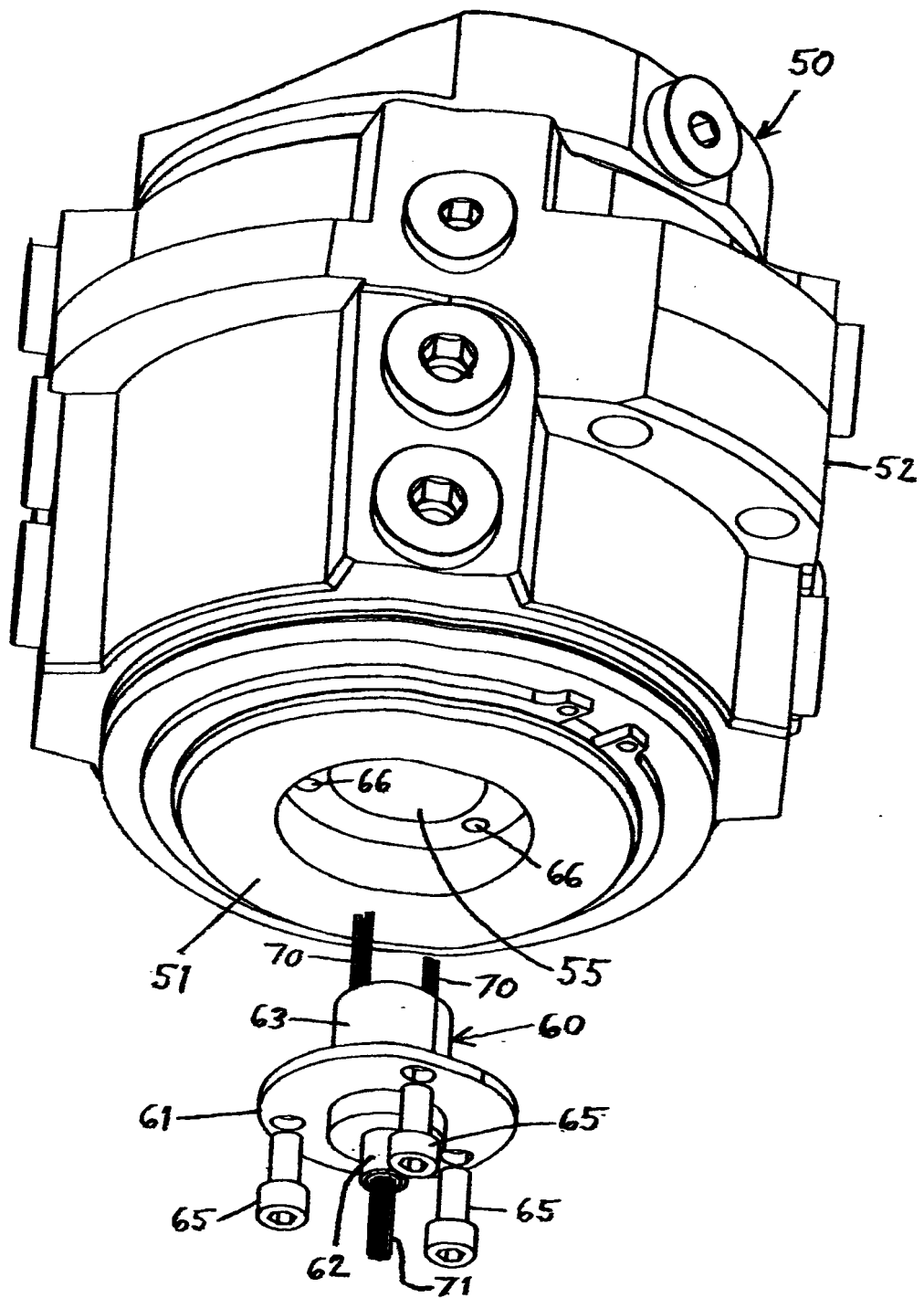


FIG. 4

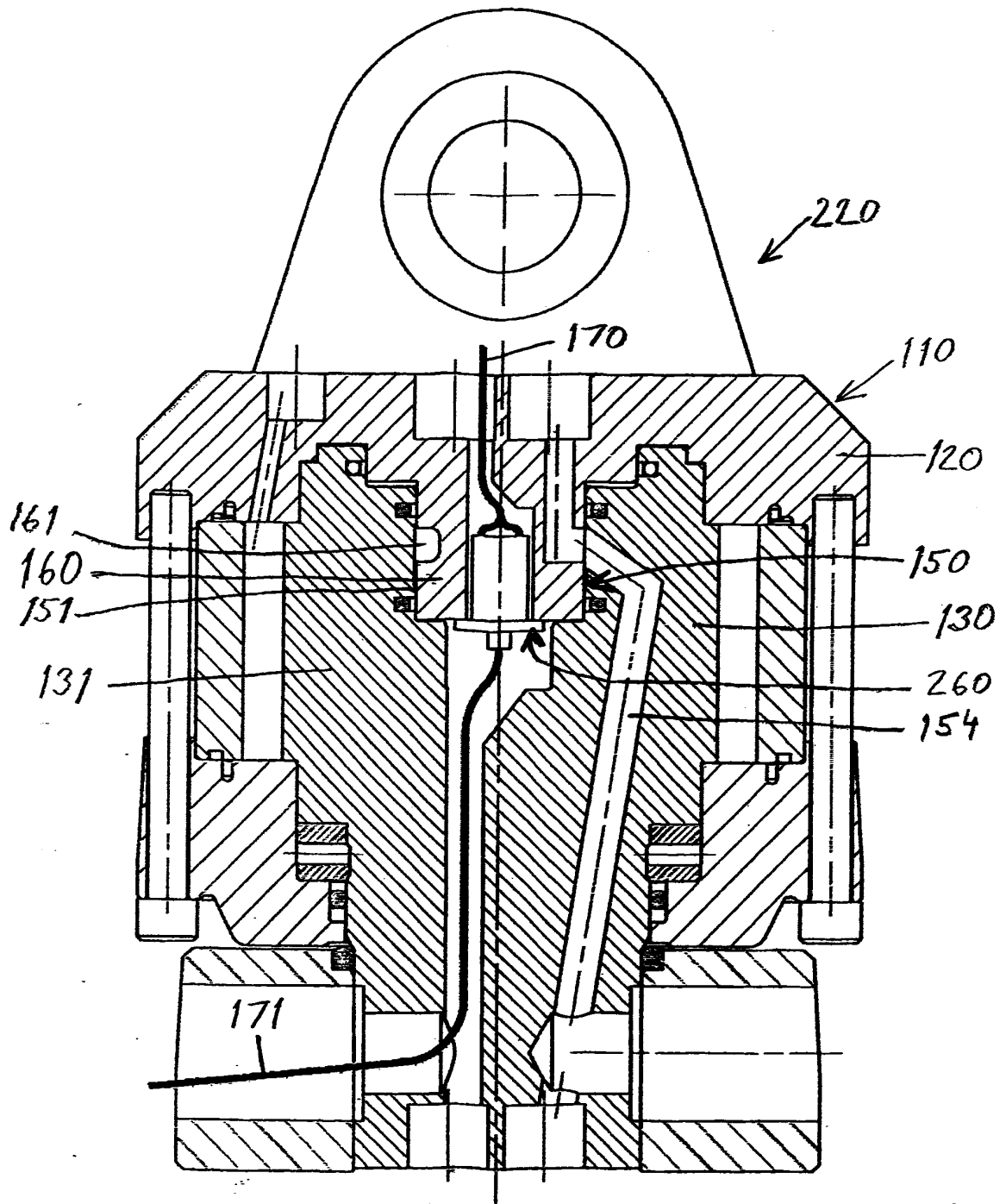


FIG. 5

REFERENCES CITED IN THE DESCRIPTION

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