**(12) STANDARD PATENT APPLICATION** (11) Application No. **AU 2009202063 A1**
**(19) AUSTRALIAN PATENT OFFICE**

(54) Title
**Tool for removing a chisel**

(51) International Patent Classification(s)
***B23P 19/00*** (2006.01) ***E21C 35/19*** (2006.01)

(21) Application No: **2009202063** (22) Date of Filing: **2009.05.26**

(30) Priority Data

| (31) Number | (32) Date | (33) Country |
|---|---|---|
| **10 2008 025 071.6-15** | **2008.05.26** | **DE** |

(43) Publication Date: **2009.12.10**
(43) Publication Journal Date: **2009.12.10**

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2009202063 26 May 2009

**Abstract**

The invention relates to a tool for removing a chisel, in particular from a chisel holder, having a base element which receives an actuating member, wherein the actuating member has an expeller mandrel, and wherein the actuating member is adjustable along a displacement direction. In order to be able to perform the removal simply and rapidly, it is provided in accordance with the invention that the actuating member is indirectly or directly coupled to a piston of a fluid-charged cylinder, or to an electric motor unit.

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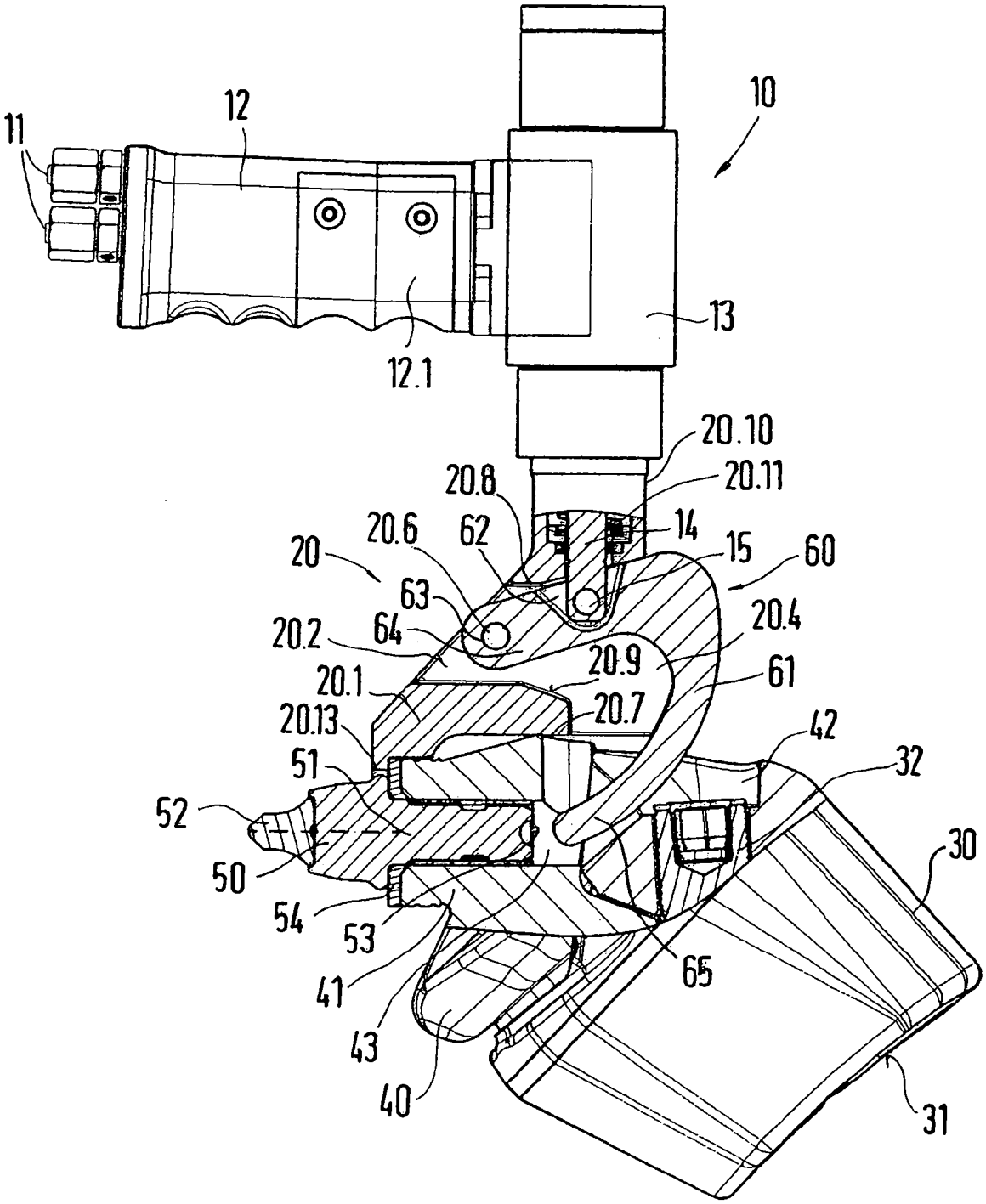


Fig.1

2009202063 26 May 2009

AUSTRALIA

Patents Act 1990

**COMPLETE SPECIFICATION**

**Standard Patent**

**Applicant(s):**

*Wirtgen GmbH*

**Invention Title:**

*TOOL FOR REMOVING A CHISEL*

The following statement is a full description of this invention, including the best method for performing it known to me/us:

**Tool for Removing A Chisel**

The invention relates to a tool for removing a chisel, in particular from a chisel holder, having a base element which receives an actuating member, wherein the actuating member has an expeller mandrel, and wherein the actuating member is adjustable.

Such tools are employed, for example, in connection with road milling machinery, recyclers, surface miners, etc. They are used for removing chisels, in particular shank chisels (round shank chisels). In this case the chisels are clampingly held in chisel receivers. Customarily, the chisel receivers are designed as through-bores. The chisel holders themselves are fastened to the surface of a milling roller tube, in particular welded to it, or are interchangeably fixed in base supports, which also are welded to the surface of a milling roller tube. Tools are known for making the removal of the chisels easier, such as are described in DE 296 23 508 U1.

This tool has two lever arms, which are connected with each other by means of a joint. Here, one of the arms constitutes the expeller mandrel, the other lever constitutes a handle element. The expeller mandrel can be inserted with its free end into the chisel receiver in such a way that its end contacts the chisel shank of the chisel to be expelled.

The tool can be placed with the second lever against a support shoulder on the milling roller tube. Then the chisel can be pushed out of the chisel receiver by a lever displacement. Finally, the expeller mandrel is threaded out of the chisel receiver. In the restricted assembly space, the manipulation of the double lever turns out to be difficult and is time-consuming. Further than that, the tool requires a support shoulder on the milling roller, which is not always available.

Removal tools are also known in the prior art, which can be placed with draw-off claws against the chisel head of the chisel. In this case a circumferential groove is required in the chisel head, into which the draw-off claws enter. It is no longer possible to perform a removal of the chisels, if the chisel heads are worn to such a large extent that the groove is no longer sufficiently available. Also, chisels with broken-off chisel heads cannot be removed. Such tools are known from DE 43 23 699 C2, DE 32 23 761 A1, DE 84 03 441 U1 and USP 6,526,641 B1.

A further tool is described in DE 30 26 930 A1. This tool has a support arm, which can be fixed in place against the chisel holder. A pivot lever, which has a handle, is coupled with the support arm. The chisel holder has a linearly displaceable plunger. For removing the chisel, a pivot arm facing away from the handle is placed against the plunger. As a result of displacing the handle, the plunger can be displaced and the chisel can be pushed out of the chisel receiver by means of it. The plunger, which is structurally connected with the chisel holder, constitutes an additional part and assembly outlay. Further than that, it requires an increase in the structural space in the chisel holder, which is not always acceptable in connection with modern precision milling machines.

Moreover, this type of construction requires the fixation of the chisel in a blind hole-like chisel receiver. The latter can become soiled in the course of operation, which leads to a loss of the system.

It is the object of the invention to create a tool of the type mentioned at the outset, by means of which chisels can be simply and rapidly exchanged.

This object is attained in that the actuating member is coupled indirectly or directly to a fluid-charged cylinder-piston system, or to an electric motor-driven unit. For example, the cylinder can be a fluid cylinder, in particular a hydraulic

cylinder, which can be charged via an oil circuit. By means of this it is possible in particular to build up a large pressure on the piston and to transmit correspondingly large forces to the actuating member. In this way it is possible to dependably remove chisels without a large force expenditure. The electric motor- driven unit can for example be a spindle-nut unit, which can be driven by an electric motor.

In accordance with a preferred embodiment of the invention it can be provided, that the actuating member is seated on the base element, pivotable around a stationary pivot bearing. The base element can be associated with the chisel holder, and a reproducible expelling process can be realized via the stationary pivot bearing.

If it is provided that, with the displacement movement of the actuating member, the expeller mandrel moves on a curved course, it is possible to realize a varying progression of the moment. For example, with an appropriate layout of the tool it is possible to generate a high moment at the start of the displacement movement, which is thereafter continuously reduced. In this way the condition, that at the start of the displacement movement it is necessary to initially overcome the frictional adherence between the chisel and the chisel receiver, is met in a simple way.

In a preferred manner it is provided that the base element has a support section for direct support on the chisel holder, or indirectly on the chisel holder, for example on a wear disk. By means of the stationary assignment of the tool to the chisel holder it is possible to do without additional support elements, for example an expelling shoulder on the milling roller tube. With this it is possible to realize a more compact arrangement of the individual chisel holders on the milling roller tube and no additional outlay is required, such as is the case in the prior art.

Preferably those locations on the chisel holder are utilized for the support, which are not subject to excessive wear, so that the tool can always be placed in a reproducible manner. The wear disk in particular, which is customarily arranged between the chisel head and a support surface of the chisel holder, offers such an ideal support location.

For example, the support section can be arranged on a fork- shaped expelling element. The tool can be placed against the chisel holder with the fork-shaped expelling element in such a way that the support section comes to lie on the side of the chisel head of the chisel. There, the support section can then engage the wear disk.

In accordance with a preferred embodiment variation of the invention it can be provided that, distanced from the support section, the base element has an externally located contact face for placement against the chisel holder. It is possible by means of the support section and the contact face to create a definite assignment of the tool and the chisel holder. In this way the tool can always be associated in the same way with the chisel holder.

A conceivable invention variation can be distinguished in that the base element has a receptacle, in which the actuating member is received between two lateral walls which delimit the receptacle, and that the lateral walls have seating receptacles, in which the actuating member is pivotably seated.

This simple structural design makes possible the stable guidance of the actuating member between the two lateral walls.

A further preferred invention variation provides that the displacement movement of the actuating member is limited by means of at least one stop arranged on the base element. Then the displacement movement of the actuating member can be limited. In this case the actuating member can be controlled in such a way that the jamming of the actuating member in its end position is

not possible.

In case of an appropriate limitation, the actuating member is positioned by means of a stop in its initial position in such a way that the easy placement against the chisel holder is possible. The limitation of the actuating movement of the actuating member in the removal position prevents the actuating member from becoming jammed in the chisel receiver.

In particular, it can be provided here for the actuating member to be movable out of its initial position into the removal position, and for the actuating member to be maintained in a spring-loaded manner in its initial position by means of a spring element. This step assures that, when the cylinder is switched to no pressure, the actuating member remains in its initial position, or respectively returns into it. It is of course obvious that, for example in case of the use of a double-acting cylinder, it is possible to do without the spring-loading.

In order to achieve a simple and dependable operation of the tool also in locations which are hard to access, it can be provided that the base element is coupled with a handle element indirectly, or directly by means of a connecting member, and that the handle element is pivoted in respect to the base element by means of a pivot bearing.

In accordance with a preferred embodiment variation of the invention it can be provided that the expeller mandrel is connected to a lever arm having a coupling for the pivotable connection of the piston rod, and that the lever is pivotably seated at a distance from the coupling.

In what follows, the invention will be explained in greater detail by means of several exemplary embodiments represented in the drawings. Shown are in:

Fig. 1, a base support with a chisel holder, to which a tool is assigned, in a first operating position in a lateral view and in partial section,

Fig. 2, the representation in accordance with Fig. 1 in a second operating position,

Fig. 2, the representation in accordance with Fig. 1 in a third operating position,

Fig. 4, an adapter of the tool represented in Fig. 1 in a perspective representation,

Fig. 5, the base support and the chisel holder in accordance with Fig. 1 in a lateral view and partial section, in which a further embodiment variation of the tool has been assigned to the chisel holder,

Fig. 6, the base support and the chisel holder in accordance with Fig. 1 in a lateral view and partial section, in which a third embodiment variation of the tool has been assigned to the chisel holder,

Fig. 7, the base support and the chisel holder in accordance with Fig. 1 in a lateral view and partial section, in which a fourth embodiment variation of the tool has been assigned to the chisel holder,

Fig. 8, a milling roller tube with a chisel holder fastened on it in a lateral view and partial section, in which a fifth embodiment variation of the tool has been assigned to the chisel holder.

Fig. 1 shows a tool 10 with a handle 12. A battery has been integrated into the handle 12. The battery can be charged in an appropriate charging station via two electrical current contacts 11. The battery is used for supplying electrical current to an electric motor. The electric motor is contained in a housing attachment, which is connected to the handle 12. A cylinder 13 is contained in this housing attachment. In the present case, the cylinder 13 is embodied as a hydraulic cylinder, so that an appropriate hydraulic circuit system is integrated into the housing attachment. A piston is seated in the cylinder 13 and is displaceable between two end positions. A

trigger 12.1 has been installed on the handle 12. This trigger 12.1 closes a contact of an electrical circuit and in this way activates the electric motor in the housing attachment. The electric motor, together with the hydraulic system, causes the displacement of the piston in the cylinder 13. Alternatively it is also conceivable to integrate lines into the handle 12, which are conducted to fluid connectors on the handle 12. The fluid connectors are designed as quick-release couplings.

They can be connected to counter-coupling elements of hoses. The hoses can extend, for example, from a hydraulic system of a road milling machine or a surface miner. The lines integrated into the handle 12 are conducted to the cylinder 13. Also, a piston is housed, linearly displaceable, in the handle 12. The displacement movement of the piston can be regulated by a valve, which is controllable by means of a trigger 12.1 on the handle 12. The adapter 20 represented in Fig. 4 can be connected to the cylinder 13. This adapter 20 will be explained in greater detail in what follows by making reference to Figs. 1 and 4. It has a base element 20.1. With two lateral walls 20.4, the base element 20.1 delimits a receptacle 20.2. An actuating member 60 in the form of a lever is pivotably seated in this receptacle 20.2. The actuating member 60 has a lever arm 64, to which an expeller mandrel 65 is connected in one piece. The expeller mandrel 65 is formed in the shape of a bow. The free end of the expeller mandrel 65 is designed to be convexly crowned. On its end facing away from the expeller mandrel 65, the lever arm 64 is provided with a bore, which constitutes a seating receptacle 63.

This seating receptacle 63 is aligned with corresponding bores in the lateral walls 20.4. A seating bolt 20.6 has been pushed through the aligned bores and the seating receptacle 63, and can be secured by means of locking rings, as represented in Fig. 4. The seating bolt 20.6 constitutes a rotary shaft which, in accordance with Fig. 1, extends vertically in respect to the

drawing plane. The lever arm 64 is provided with a coupling 62 in the area between the seating receptacle 63 and the connecting point of the expeller mandrel 65 on the lever arm 64. A piston rod 14 can be connected by its seating receptacle 15 with this coupling 62. On its end facing away from the seating receptacle 15, the piston rod 14 has a collar 16, as illustrated in Fig. 4. A connecting element 20.10 is formed in one piece on the base element 20.1. Fig. 1 shows that the connecting element 20.10 has a cup-shaped receptacle, which is in a spatial connection with the receptacle 20.2 via a through-bore. A spring element 20.11 has been inserted into the cup-shaped receptacle. The spring element 20.11 is designed as a helical spring. The piston rod 14 is conducted through the helical spring, so that the free end of the piston rod 14 comes into contact with the actuating member 60.

In the process, the piston rod 14 comes to lie with its seating receptacle 15 against the coupling 62. In the area of the coupling 62, the lever arm 64 has two bores aligned with each other, which can be aligned with the seating receptacle 15 in the piston rod 15.

To this end, the collar 16 of the piston rod 14 is placed against the spring end protruding from the cup-shaped receptacle. It is thereafter possible to compress the spring element 20.11 by means of pressure on the collar 16 until the seating receptacle 15 is aligned with the bores in the coupling 62. A hinged bolt can be pushed through the aligned bores and the seating receptacle 15. As Fig. 4 shows, circular passages 20.5 are provided in the lateral walls 20.4.

With its bores, the lever arm 64 can be aligned with the bores in the coupling 62. It is then possible to expel the hinged bolt through the passages 20.5 into the bores of the lever arm 64 and through the seating receptacle 15. Simple coupling, or respectively uncoupling, of the piston rod 14 can be performed

by means of this. In the coupled state, the piston rod 14 is maintained under spring pre-tension in the position shown in Fig. 1. Therefore the actuating member 60 is also fixed in this position.

The adapter 20 can be connected with the housing attachment by means of the connecting element 20.10. In this case a rotary seating is formed between the connecting element 20.10 and the housing attachment, so that the housing attachment can be rotated in respect to the base element 20.1. In the mounted state, the piston rod 14 rests with its collar 16 against the piston, which is guided in the cylinder 13. Here, the piston is arranged in the cylinder 13 in its end position, which defines the expelling position.

As illustrated in Fig. 1, stops 20.8 and 20.9 are provided in the area of the receptacle 20.1 of the base element 20.1.

These stops 20.8 and 20.9 are used for limiting the displacement movement of the actuating member 60. To this end, the actuating member 60 has corresponding end faces, which can be brought into contact with the stops 20.8 and 20.9. In Fig. 1, the actuating member 60 rests against the stop 20.8. In Fig. 3, the actuating member 60 rests against the stop 20.9.

As can be seen in Fig. 4, an expelling element 20.13 is formed in one piece with the base element 20.1. The expelling element 20.13 is embodied in a fork shape and has a support section 20.14.

The above described tool 10 is used for removing a chisel 50, which is received in a chisel holder 40. The chisel holder 40 is exchangeably maintained in a base support 30.

For this purpose, the base support 30 has a plug-in receptacle, which receives a plug-in shoulder of the chisel holder 40. The chisel holder 40 can be fixed in place on the base support 30 by means of an attachment screw 32. The base support 30 has a concave support face 31. With it, it can be

placed on the surface of a milling roller tube and welded in place on it. The chisel holder 40 has a neck 41, into which a chisel receiver 43 has been cut in the form of a bore. The back of the chisel receptacle 43 is accessible through a cutout 42. In the present case, the chisel 50 is embodied as a round shank chisel. It has a chisel head, on which a chisel shaft 51 has been formed in one piece. A clamping sleeve has been drawn on the chisel shaft 51. The clamping sleeve is maintained on the chisel shaft 51 so that it cannot be axially displaced, but is freely rotatable in the circumferential direction. As Fig. 1 shows, the chisel 50 has been inserted with its chisel shaft 51 into the chisel receptacle 43 of the chisel holder 40 in such a way that it is clampingly maintained therein by means of the clamping sleeve. In the inserted state, the chisel 50 is supported through its chisel head on a wear-protection disk 54, which has been drawn on the chisel shaft 51. The wear-protection disk 54 is arranged between the chisel head and the clamping sleeve. With its side facing away from the chisel head, the wear-protection disk 54 rests against a support face of the chisel holder.

When operationally used, the chisel 50 can rotate with its chisel head on the wear-protection disk 54. In the process, the chisel shaft 51 also rotates in the clamping sleeve. In the customary manner, the chisel head of the chisel 50 has a chisel tip 52 consisting of a hard alloy, for example.

Once the chisel has reached its worn-out state, it must be removed. Here, the tool 10 described in the drawing figures is used. The tool 10 is then placed on the chisel holder 40, while the expelling element 20.13 rests with its support section 20.14 on the front of the wear-protection disk 54. The contact element 20.13 can of course also be indirectly or directly supported on a suitable, arbitrary location of the chisel holder 40.

In the process, a positive connection in the mounting

direction of the chisel should be produced between the expelling element 20.13 and the chisel holder 40. Furthermore, the base element 20.1 has a contact face 20.7, by means of which the base element 20.1 is supported on the surface of the chisel holder 40. It is possible to cause a defined coordination of the tool 10 and the chisel holder 40 by means of the contact face 20.7 and the support section 20.14. In the course of placing the tool 10 against the chisel holder 40, the expeller mandrel 65 also moves through the cutout 42. In the process, the free end of the expeller mandrel 65 is arranged opposite the free end of the chisel shaft 51. The free end of the chisel shaft 51 form a support face 53. One the tool 10 has been brought into the position shown in Fig. 1, the trigger 12.1 on the handle 12 can be operated.

With the actuation of the trigger 12.1, the electric motor in the housing attachment is activated. It supplies hydraulic fluid to the cylinder 13, so that the piston is displaced in the cylinder 13. Because the piston rests indirectly or directly against the collar 16 of the piston rod, the latter is also displaced into the positions represented in Fig. 2. The spring element 20.11 is also compressed in the course of this displacement movement.

With the displacement of the piston rod 14, the actuating member 60 is pivoted around its seating receptacle 63. In the course of this, the actuating member 60 dips with its expeller mandrel 65 into the chisel receptacle 43 in such a way that the free end of the expeller mandrel 65 comes into contact with the support face 53 on the chisel shaft 51. With the displacement of the actuating member 60, the chisel 50 is pushed out of the chisel receptacle 43. In the course of this, the support section 20.14 maintains the wear-protection disk 54 in its position. Accordingly, the clamping sleeve is pushed into the cylindrical bore of the wear-protection disk 54. In the course of this, the

clamping sleeve is compressed radially inward, because of which the clamping effect is partially compensated. Therefore a lesser expelling force is required. The actuating movement of the actuating member 60 is limited by the stop 20.9.

In this final position, a switch also turns off the electrical current supply for the electric motor in the housing attachment. This operating position is shown in Fig. 3. Here, the chisel 50 has been moved completely out of the chisel receptacle 43. Because power for the electric motor has been cut off, the hydraulic pressure is removed from the piston.

The spring element 20.11 can then reduce its pre-tension, so that the actuation member 60 is moved back in a counterclockwise direction into its initial position shown in Fig. 1. In the course of this, the piston in the cylinder 13 is also moved back into its initial position. The tool 10 can now be removed from the chisel holder 40, so that the wear-protection disk 54 is released. The chisel 50 can be removed.

Tool variations are shown in Figs. 5 to 8. In the representations in accordance with Figs. 5 to 7, the holder exchange system, consisting of the base support 30, the chisel holder 40 and the chisel 50, corresponds to the arrangement in accordance with Figs. 1 to 4. Fig. 8 illustrates that the tools 10 in accordance with the invention are not solely restricted to employment with these basically known exchange systems. Instead, an individual case is also conceivable, in which the chisel holder 40 has been welded directly on a milling roller tube F (see the weld seam 44).

Essentially, the tool embodiment in accordance with Fig. 5 corresponds to the embodiment in accordance with Figs. 1 to 4. Only the actuating member 60 is constructed differently. This actuating member 60 is designed as a plane gear in the form of a four-link system, which saves structural space. Two levers 61, 65.2 are used here, which are hingedly connected via pivot

bearings 65.1, 65.4 to an expeller mandrel 65. In this case, the pivot axes are oriented perpendicularly in respect to the drawing plane.

Facing away from the expeller mandrel 65, the lever 61 is connected to the piston rod 14 via a pivot bearing (seating bolt 20.6). This connecting area corresponds to the connecting area of the piston rod 14 to the actuating member 60 in accordance with Figs. 1 to 4. Reference is made to the above explanations.

On its end facing away from the expeller mandrel 65, the second lever is connected to the lateral walls 20.4 by means of a pivot bearing 65. Again, the pivot axes are oriented perpendicularly in respect to the drawing plane. Fig. 5 shows the initial position of the tool. When actuating the trigger 12.1, the piston rod 14 is displaced linearly downward in the drawing plane. In the process, the levers 61 and 65.2, which are connected via the expeller mandrel 65, are synchronously pivoted in a clockwise direction. The expeller mandrel 65 simultaneously enters into the chisel receptacle 43 and pushes the chisel 50 on its support face 53 out of the chisel receptacle 43 while overcoming the clamping force of the clamping sleeve S.

After reaching the expelling position, the spring element 20.11 pushes the actuating member 60 back into the initial position shown in Fig. 5.

Fig. 6 shows a further tool embodiment, in which the adapter 20 again essentially corresponds to the adapters 20 in accordance with Figs. 1 to 5. Therefore only the different characteristics will be addressed, and reference is otherwise made to the above explanations. The connecting element 20.10 of the adapter 20 is provided with a receptacle, into which a bent tube 66.2 has been inserted and is held there. An element 66.7 of low flexural strength, in this case a link chain, such as is also used in principle in propulsion technology, is inserted into this tube 66.2. With its one end, the link chain is pivotably

fastened to the seating receptacle 15 of the piston rod (14). At the other chain end, the last chain link constitutes the expeller mandrel 65. Fig. 6 again shows the initial tool position. When actuating the trigger 12.1, the piston rod (14) is displaced (downward). In the process, it enters into a cylindrical connecting area of the tube 66.2.

The link chain is displaced in the tube 66.2, and in the process the tube 66.2 prevents the link chain from kinking. The expeller mandrel 65 is supported on the support face 53 of the chisel 50 and pushes it out of the chisel receptacle 43.

Once the link chain reaches the area of the chisel receptacle 43, the latter prevents it from kinking. After reaching the end position, the spring element 20.11 places the actuating member 60 back into its initial position shown in Fig. 6.

In the tool in accordance with Fig. 7, the tube 66.2 has preferably been filled with a fluid 66.3 in place of the link chain. A piston 66.1 is connected to the piston rod 14 by means of a crosshead link. With its exterior contours, the piston 66.1 provides a seal on the interior wall of the cylindrical area of the tube 66.2 with the aid of a seal ring. A second piston 66.1 has been sealingly seated at the other tube end, which is also cylindrically embodied. The piston 66.1 can be linearly displaced and supports the expeller mandrel 65. The tube 66.2 can enter into the chisel receptacle 43 through the cutout 42, so that the expeller mandrel 65 lies opposite the support face 53 of the chisel 65. In the course of a displacement of the piston rod 14, the piston 66.1 is pushed into the tube 66.6. The fluid 66.3 transmits this actuating movement to the second piston 66.6. In the process, the expeller mandrel 65 pushes the chisel 50 out of the chisel receptacle 43. In the course of the relief of the piston rod 14, the spring element 20.11 pushes the actuating member 60 into the initial position. The piston 66.1 is pulled

upward in the course of this. By means of the creation of a vacuum, the second piston 66.6 is also aspirated back into its initial position by the fluid 66.3.

In Fig. 8 a tool 10 is shown, in which an electric motor 66.8 has been integrated into the handle 12. The output shaft 66.9 of the electric motor 66.8 is equipped with a spindle 66.11. Facing away from the electric motor 66.8, the output shaft 66.9 is rotatably fixed in place by means of a ball bearing 66.10. Furthermore, the actuating member 60 is received in the adapter 20 between the two lateral walls 20.4 and in the present case has the shape of a disk. The edge of the actuating member 60 is provided with tooth arrangement 66.12, which meshes with the spindle 66.11.

The actuating member 60 is held in the adapter 20, and the seating receptacle 63 constitutes the pivot axis. The actuating member 60 supports the expeller mandrel 65, which has been formed as one part of, and eccentrically in respect to, the seating receptacle 63.

Again, the tool 10 can be inserted with the expeller mandrel 65 through the cutout 42 into the chisel receptacle 43, so that the expeller mandrel 65 lies opposite the support face 53 of the chisel 50. When actuating the trigger 12.1 on the handle 12, the electric motor 66.8 is activated. Because of this, the output shaft 66.9 is set into rotary motion. Via the tooth arrangement 66.12, the spindle 66.11 turns the actuating member 60 in a clockwise direction. A sufficiently large lever arm is formed by means of the spacing of the tooth arrangement 66.12 in respect to the pivot bearing 63. A large force reduction is made possible by employing the spindle gear. Upon a rotation of the actuating member 60, the expeller mandrel 65 pushes the chisel 50 out of the chisel receptacle 43. After reaching the push-out position, the electric motor 66.8 changes directions and changes the direction of rotation until the actuating member 60 has again

reached its end position shown in Fig. 8. The electric motor 66.8 is then switched off in this position.

It is understood that the described tool 10 can also be employed in connection with the most diverse, suitable chisel holders 40 and holder exchange systems.

It is to be understood that, if any prior art publication is referred to herein, such reference does not constitute an admission that the publication forms a part of the common general knowledge in the art, in Australia or any other country.

**Claims**

1. A tool for removing a chisel (50), in particular from a chisel holder (40), having a base element (20.1) which receives an actuating member (60), wherein the actuating member (60) has an expeller mandrel (65), and wherein the actuating member (60) is adjustable,

characterized in that

the actuating member (60) is directly or indirectly coupled with a cylinder-piston system (cylinders (13)) or an electric motor unit.

2. The tool in accordance with claim 1,

characterized in that

the actuating member (60) is seated, pivotable around a pivot bearing, on the base element (20.1).

3. The tool in accordance with claim 1 or 2,

characterized in that

with a displacement movement of the actuating member (06), the expeller mandrel (65) moves on a curved track.

4. The tool in accordance with one of claims 1 to 3,

characterized in that

the base element (20.1) has a support section (20.14) for support on the chisel holder (40) or on a wear protection disk (54).

5. The tool in accordance with claim 4,

characterized in that

the support section (20.14) is arranged on a fork-shaped expelling element (20.13).

6. The tool in accordance with claim 4 or 5, characterized in that,

spaced apart from the support section (20.14), the base element (20.1) has a stop face (20.7) on its exterior for placement against the chisel holder (40).

7. The tool in accordance with one of claims 1 to 6, characterized in that

the base element (20.1) has a receptacle (20.2), in which the actuating member (60) is received between two lateral walls (20.4) delimiting the receptacle (20.2), and

the lateral walls (20.4) have seating receptacles 63, in which the actuating member (60) is pivotably seated.

8. The tool in accordance with one of claims 1 to 7, characterized in that

the displacement movement of the actuating member (60) is limited by means of at least one stop (20.9 or 20.8) arranged on the base element (20.1).

9. The tool in accordance with one of claims 1 to 8, characterized in that

the actuating member (60) can be moved out of an initial position into the removal position, and

the actuating member (60) is maintained in a spring-loaded manner in the initial position by means of a spring element (20.11).

10. The tool in accordance with one of claims 1 to 9, characterized in that

the base element (20.1) is coupled indirectly or directly to a handle element (12) by means of a connecting element

(20.10), and

the handle element (12) is pivotable in relation to the base element (20.1) by means of a pivot bearing.

11. The tool in accordance with one of claims 1 to 10, characterized in that

the expeller mandrel (65) is connected to a lever arm (61) having a coupling (62) for the pivotable connection of the piston rod (14), and

the lever (61) is pivotably seated, spaced apart from the coupling (62).

12. The tool in accordance with one of claims 1 to 11, characterized in that

the expeller mandrel (65) is driven by means of a gear of the actuating member (60).

13. The tool in accordance with one of claims 1 to 12, characterized in that

the expeller mandrel (65) is driven by means of a plane gear of the actuating member (60).

14. The tool in accordance with claim 12, characterized in that

the plane gear is a parallelogram-four link system.

15. The tool in accordance with one of claims 1 to 14, characterized in that

the expeller mandrel (65) is coupled to an element (66.7) of low flexural strength, in particular to a chain, and

the element (66.7) of low flexural strength is conducted, secure against kinking, in a guide, in particular in a tube (66.2).

16. The tool in accordance with claim 15,
characterized in that
the expeller mandrel (65) is constituted by a chain link of an element (66.7) of low flexural strength, embodied as a chain.

17. The tool in accordance with one of the preceding claims,
characterized in that
the expeller mandrel 65 can be displaced by means of a fluid (66.3).

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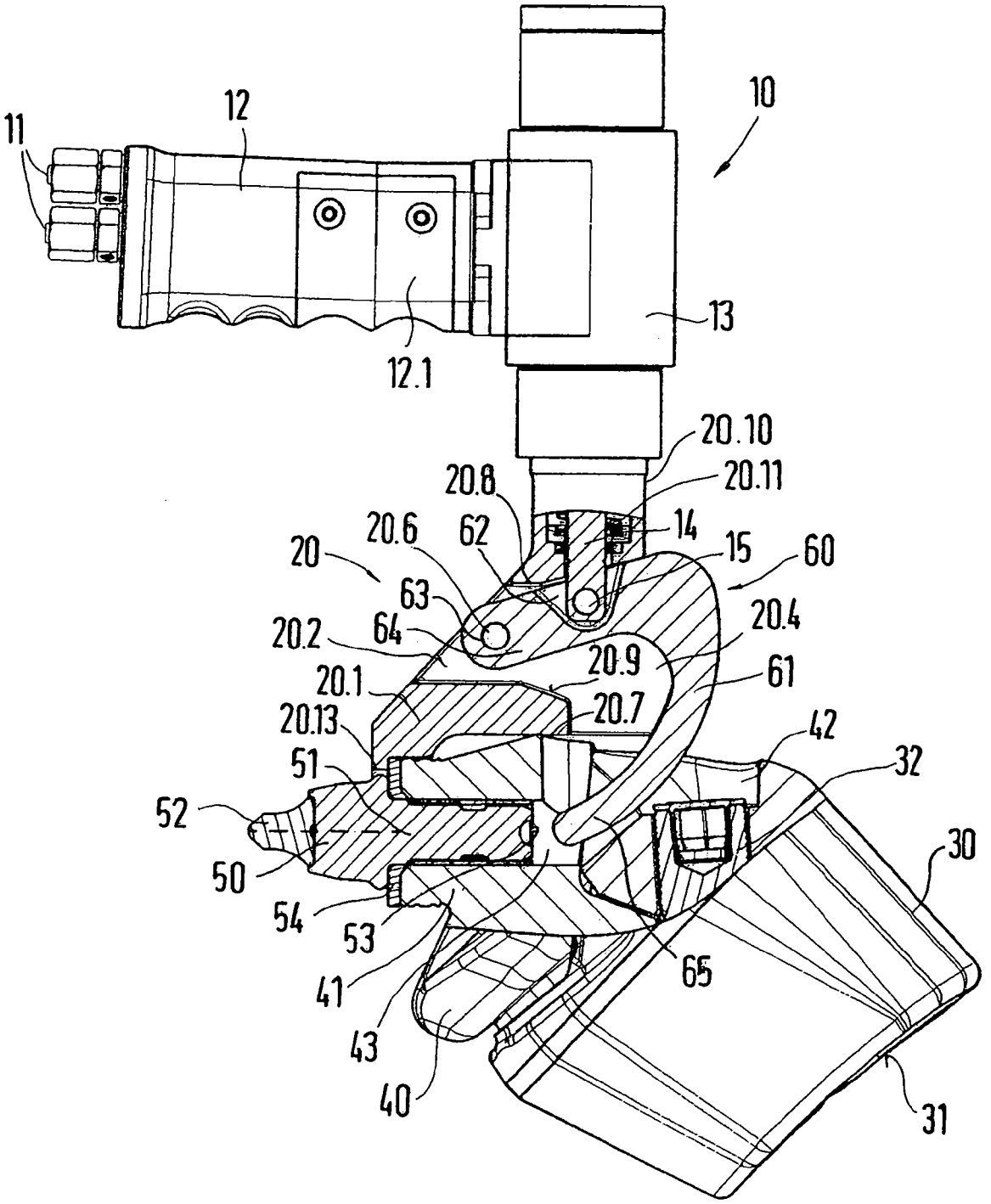


Fig.1

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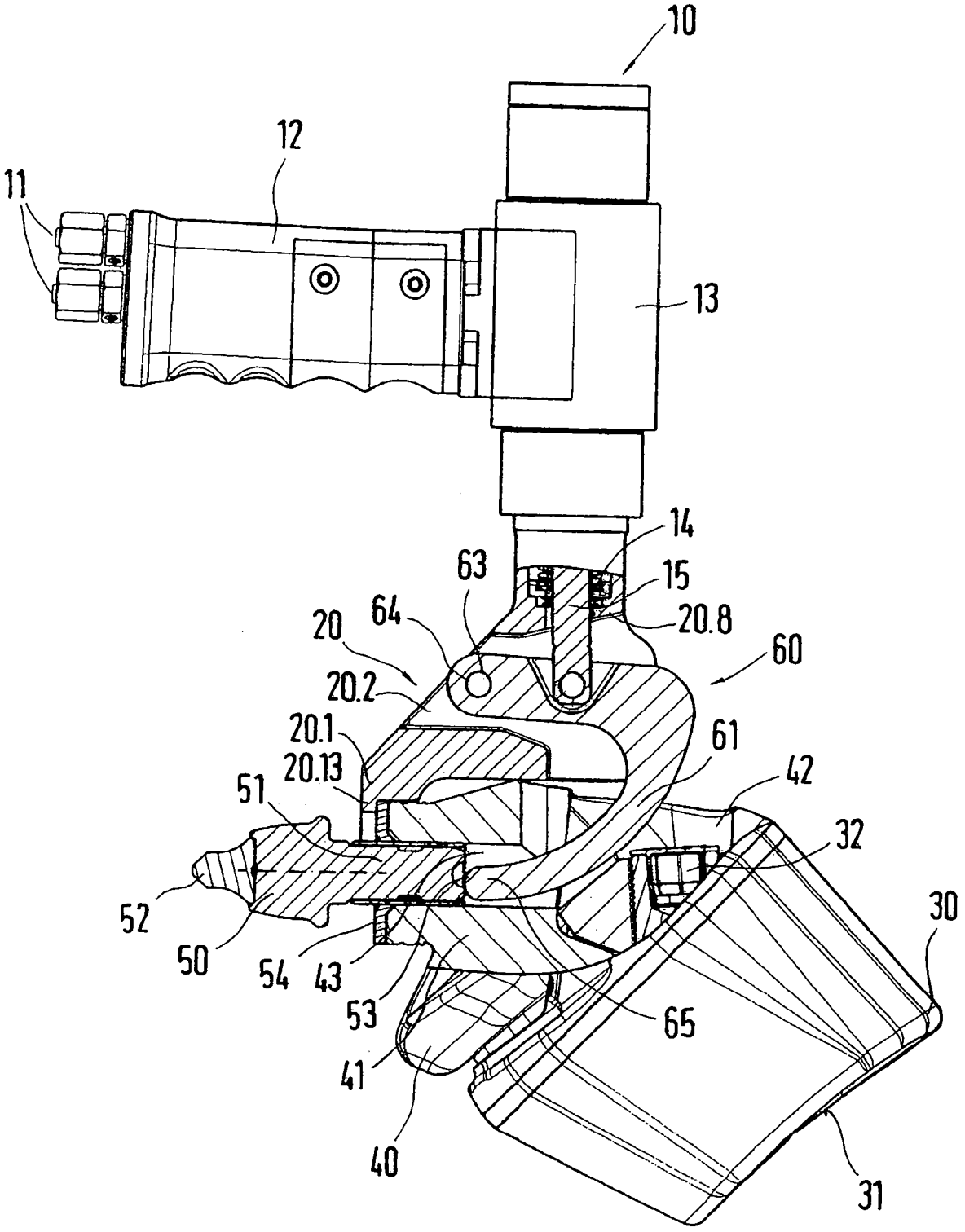


Fig.2

2009202063 26 May 2009

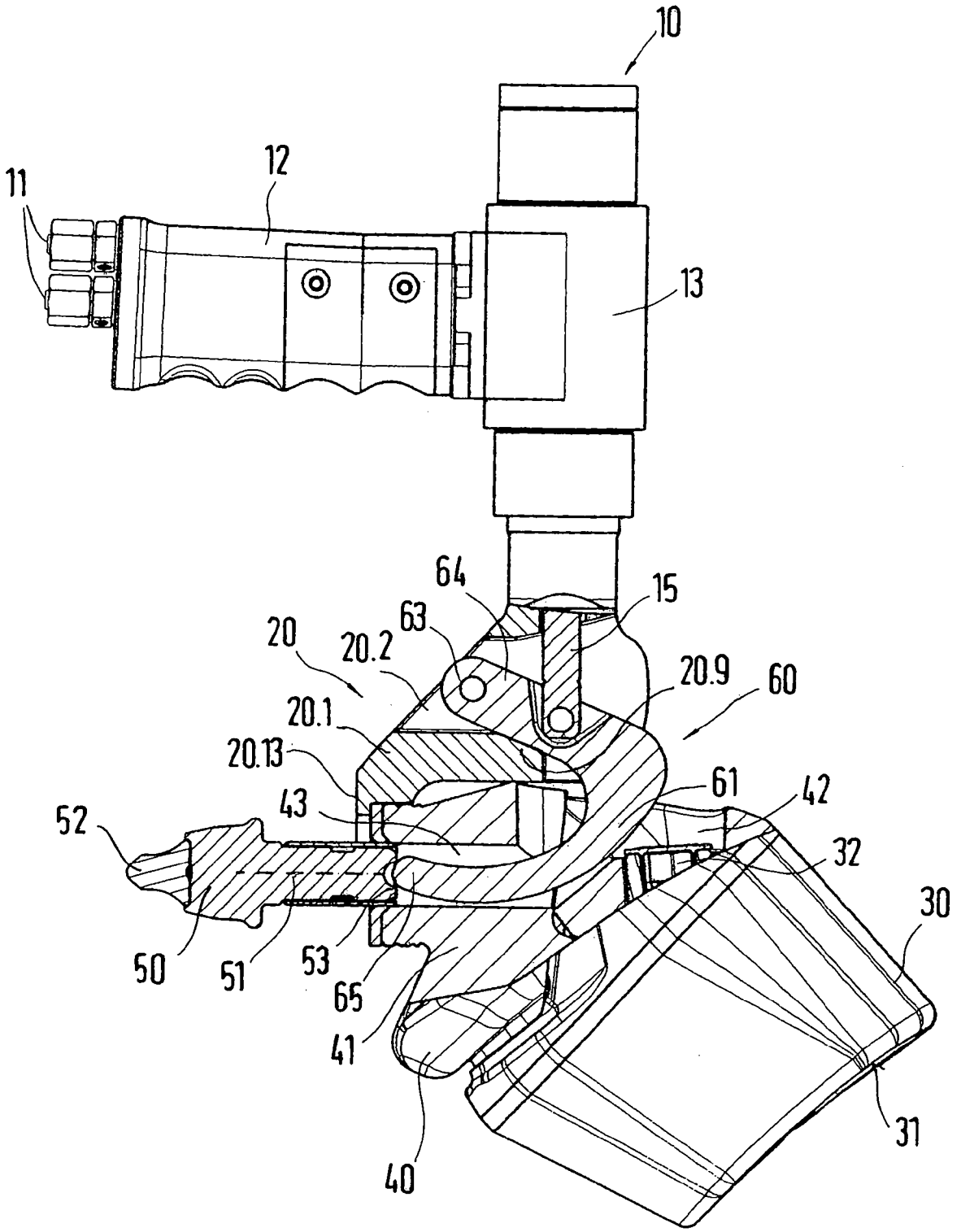


Fig.3

2009202063 26 May 2009

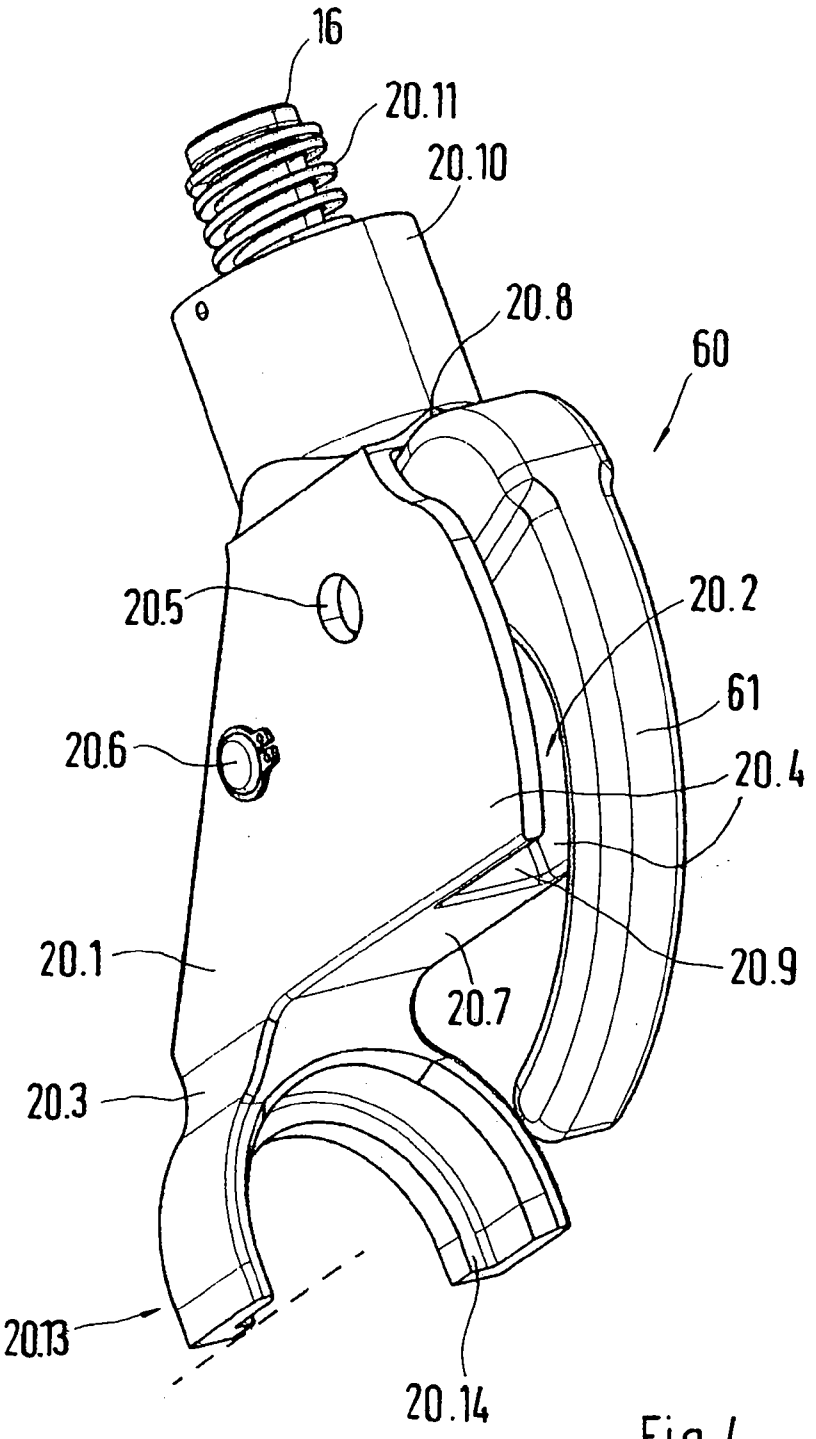


Fig.4

2009202063 26 May 2009

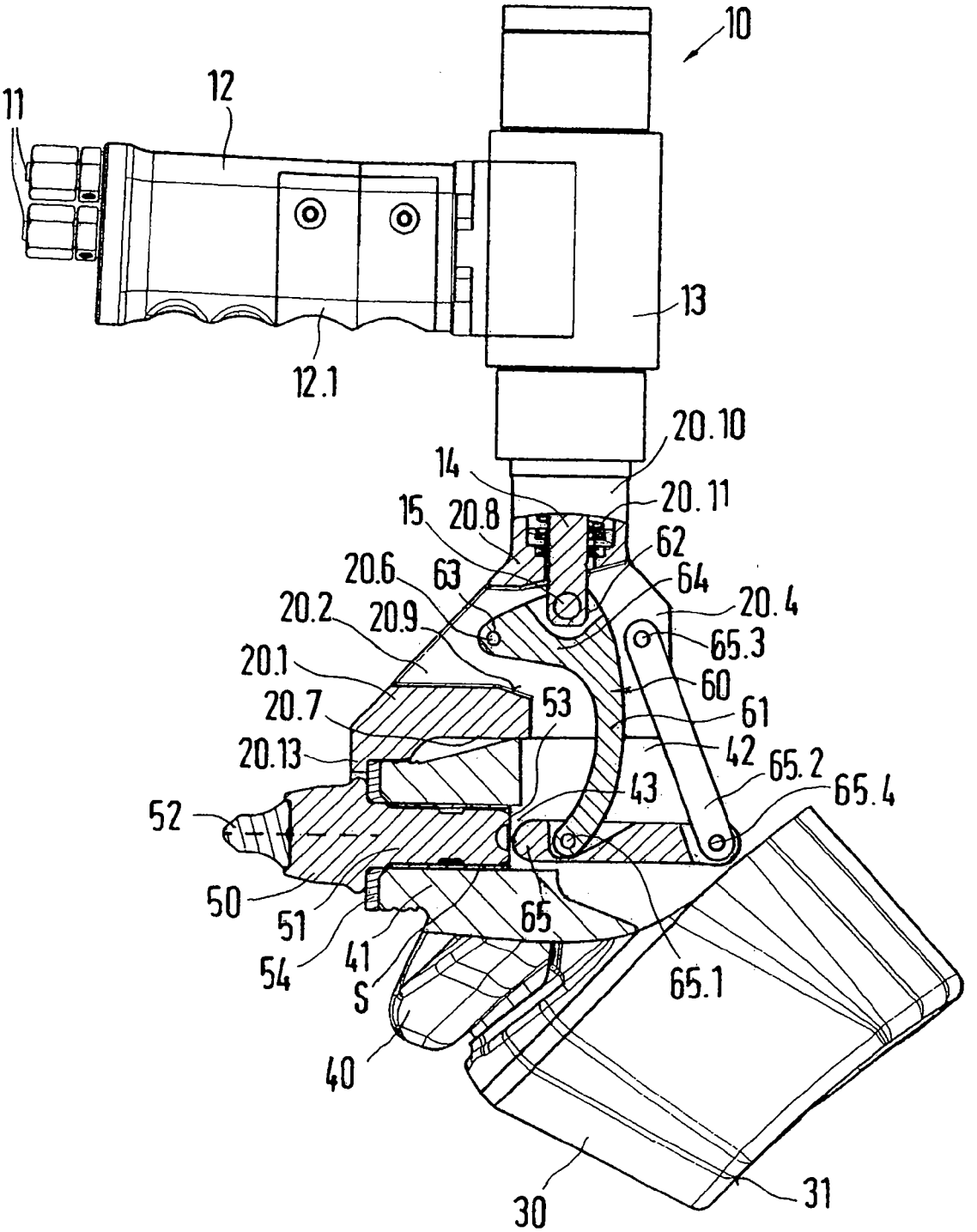


Fig.5

2009202063 26 May 2009



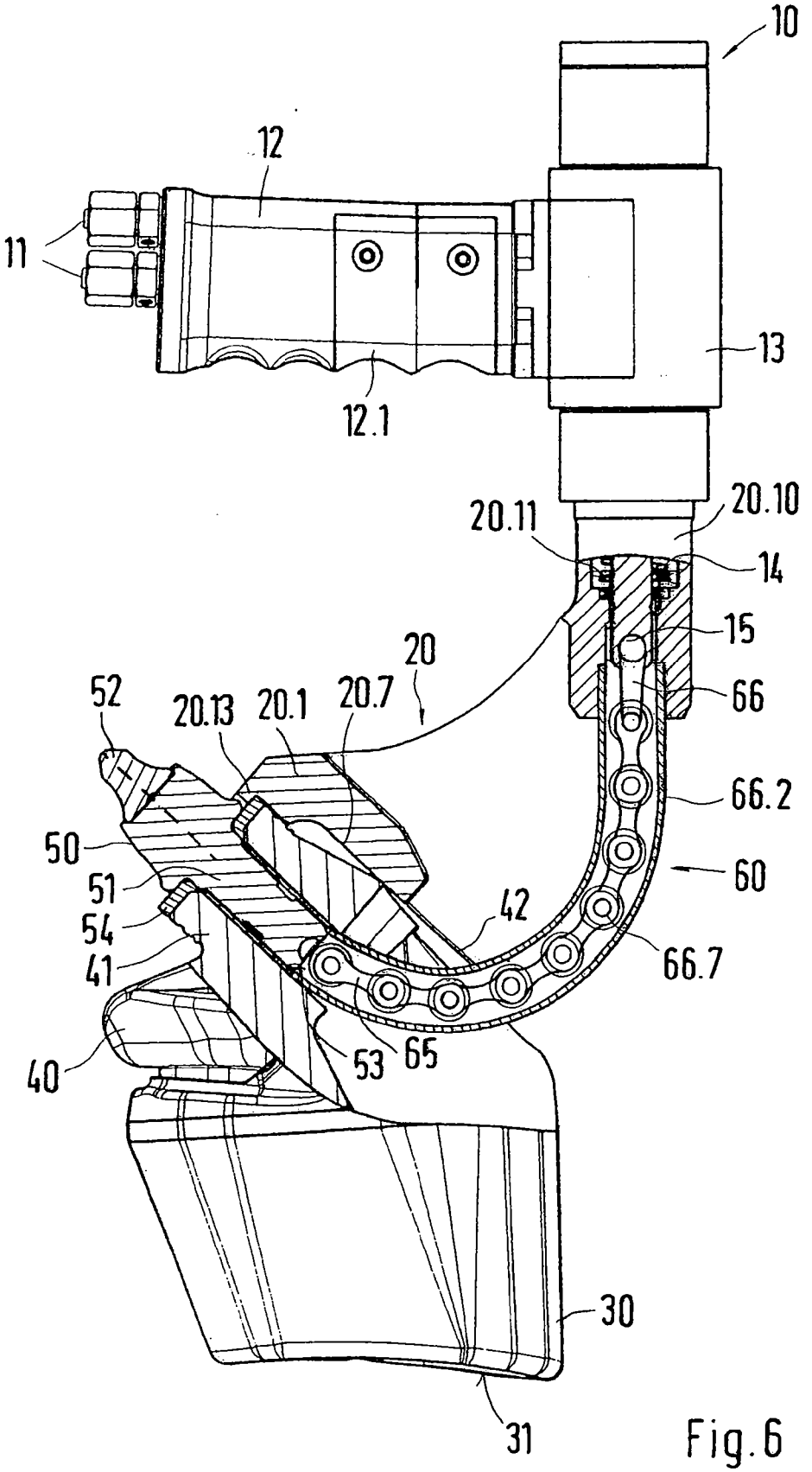


Fig.6

2009202063 26 May 2009



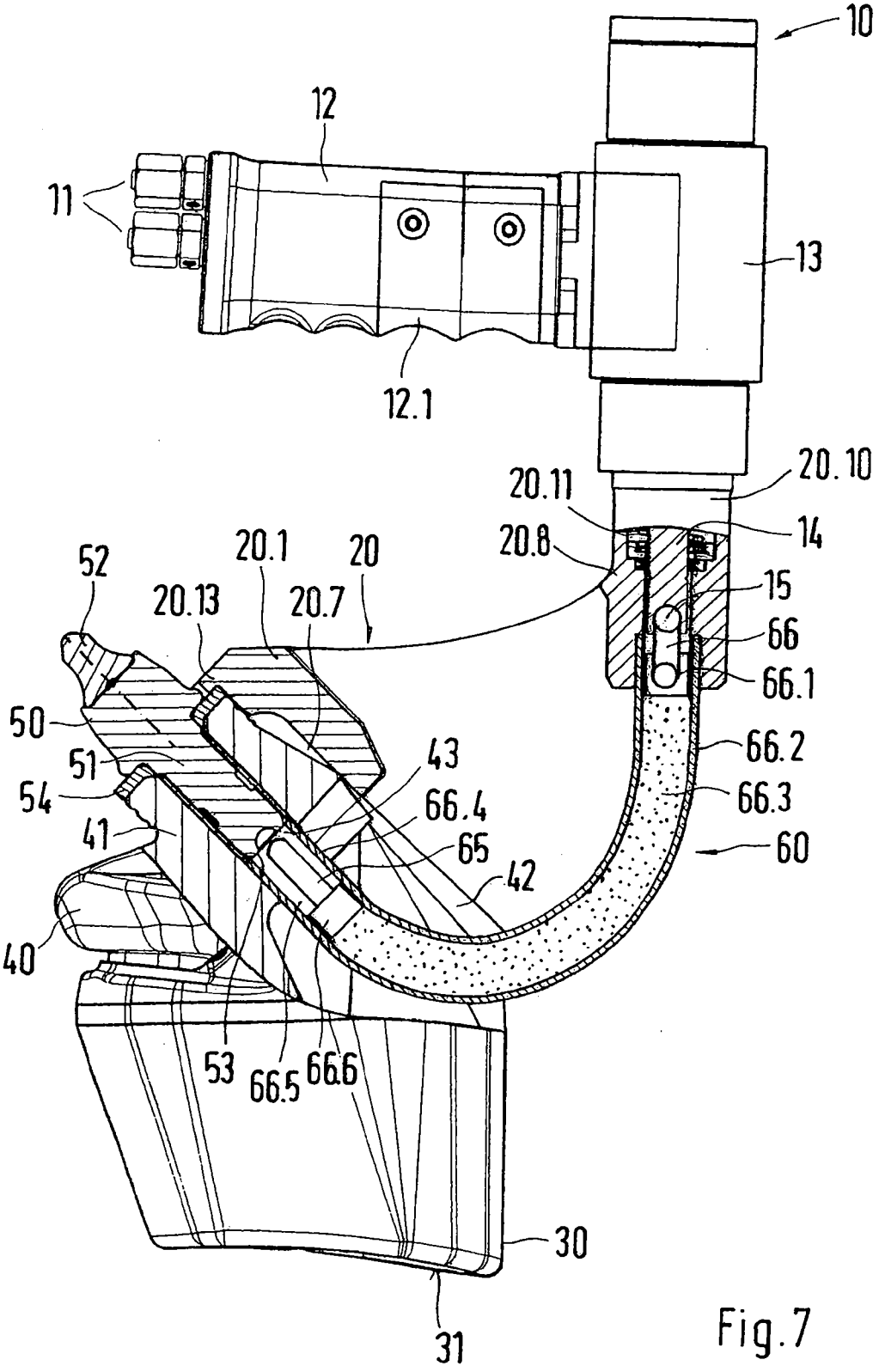


Fig.7

2009202063 26 May 2009

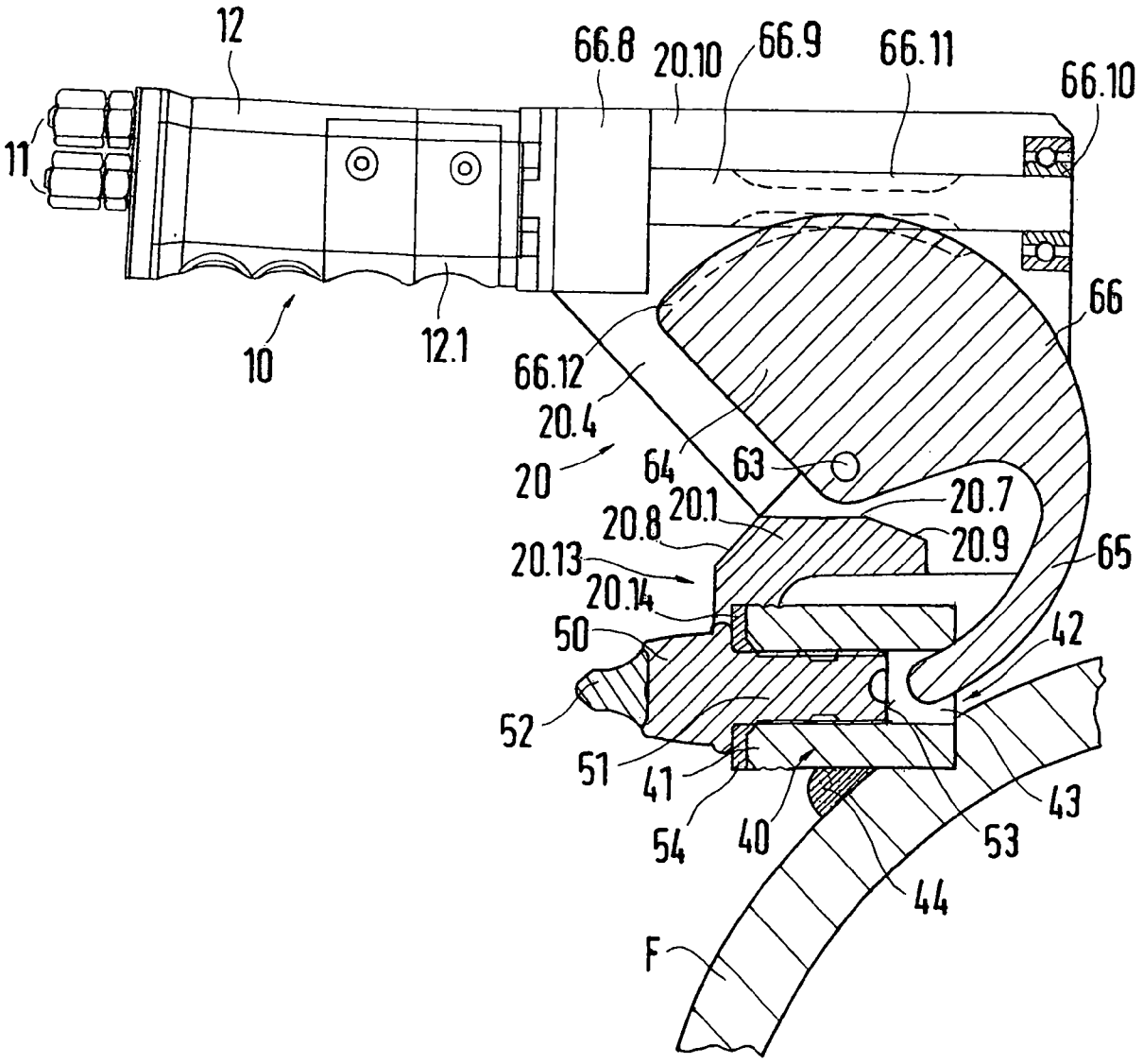


Fig.8