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(54) **DRILL PIPE, AND SYSTEM AND METHOD FOR LAYING A PIPELINE**

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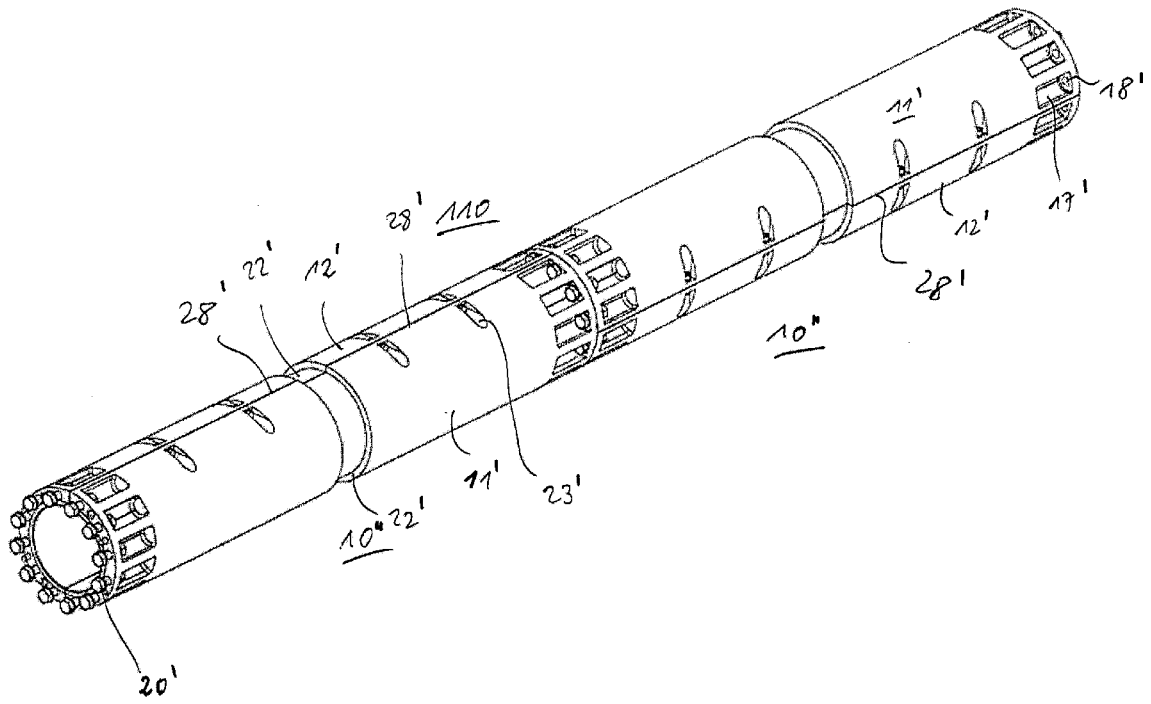
(57) **ABSTRACT**

The invention relates to a drill pipe for use during the creation of a borehole in a ground from a starting point to a target point along a predetermined drill line, in particular for the near-surface laying of underground cables or electric underground cables in the ground. The invention is characterized in that the borehole is gradually created by means of a drilling device that has a drilling tool for loosening the ground when the drill pipes are advanced, each end of the drill pipe having at least one connection section for detachably connecting it to a further element of a drill string in a tensile resistant manner; in that the drill pipe has at least one element for producing a tensile-resistant connection to a corresponding element of an advance device for advancing the drill pipe into and/or retracting it from the borehole; and in that an outer wall of the drill pipe is made in one piece. The invention further relates to a device for moving at least one drill pipe into a borehole or out of the same, and to a system and a corresponding method.



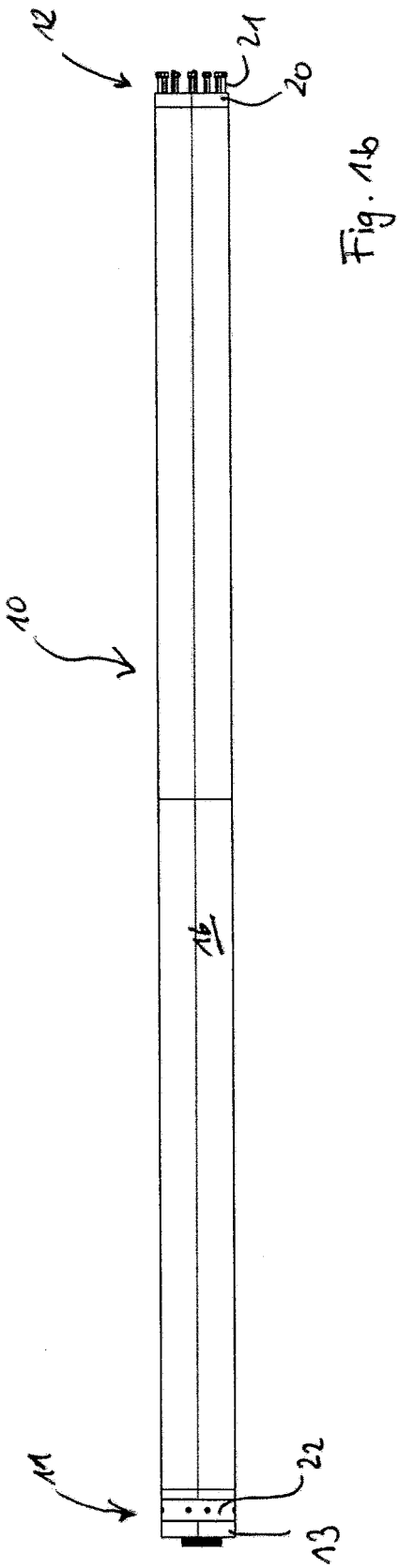


Fig. 1b

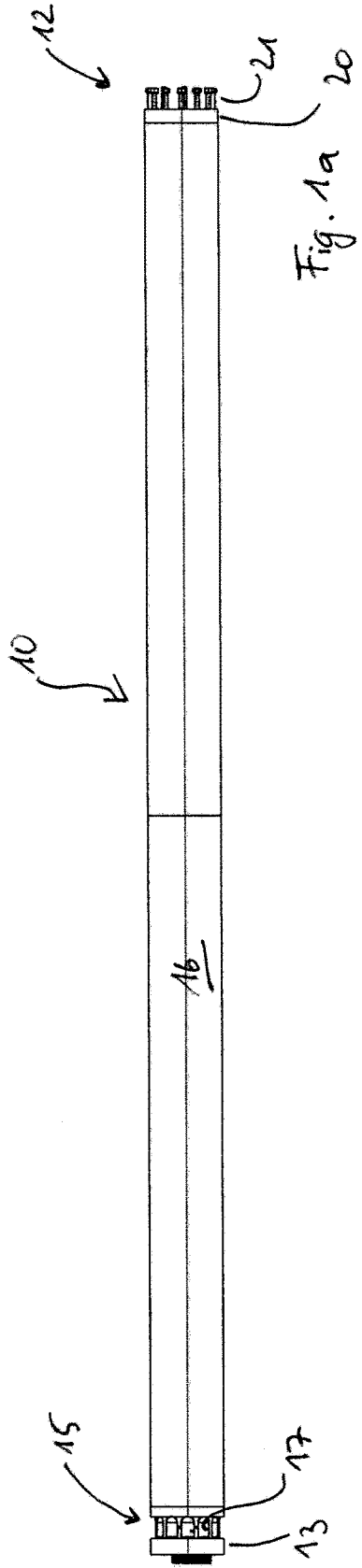


Fig. 1a

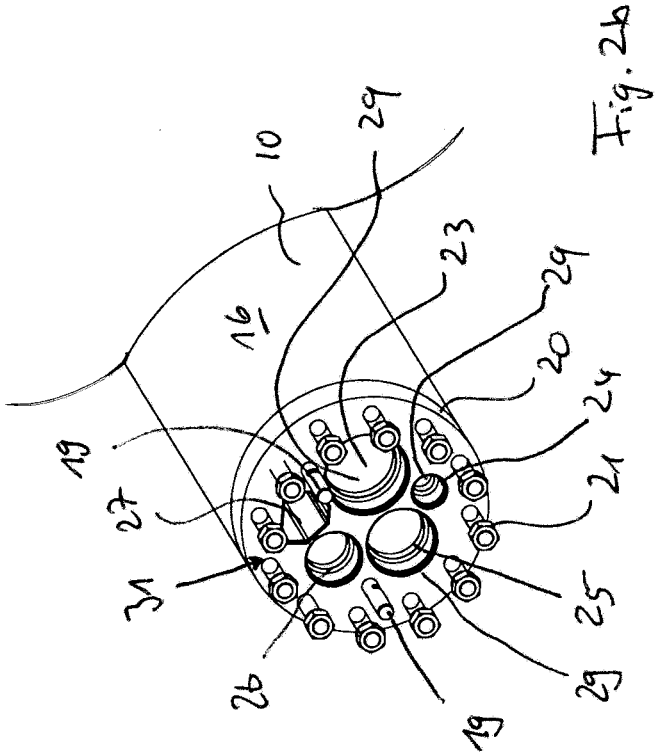

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Fig. 2b

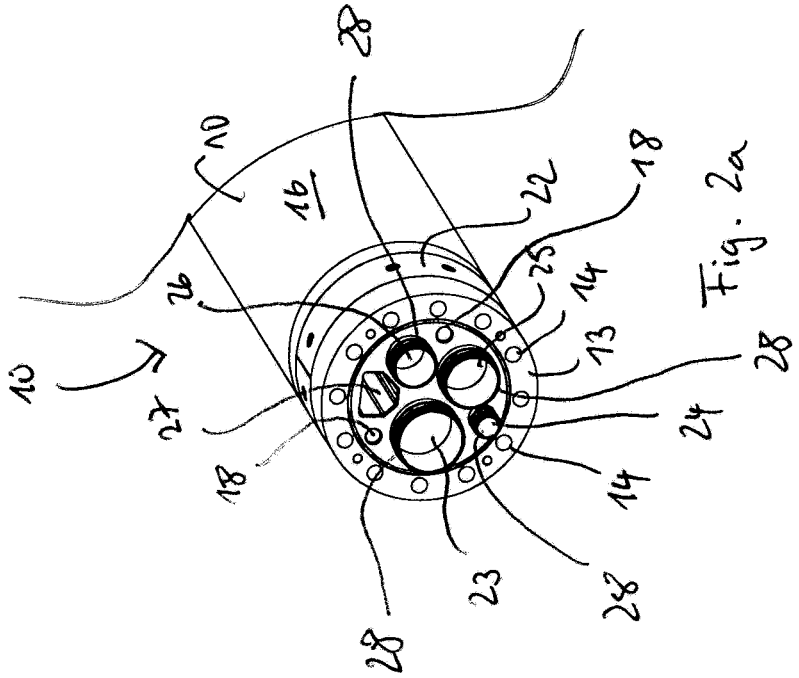
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Fig. 2a

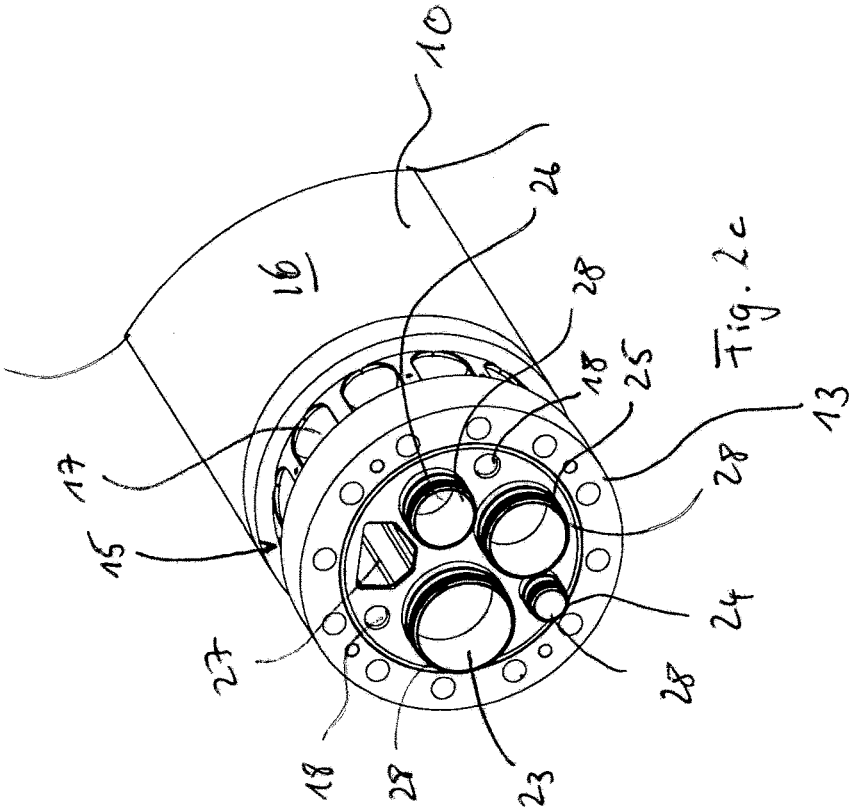

Fig. 2c

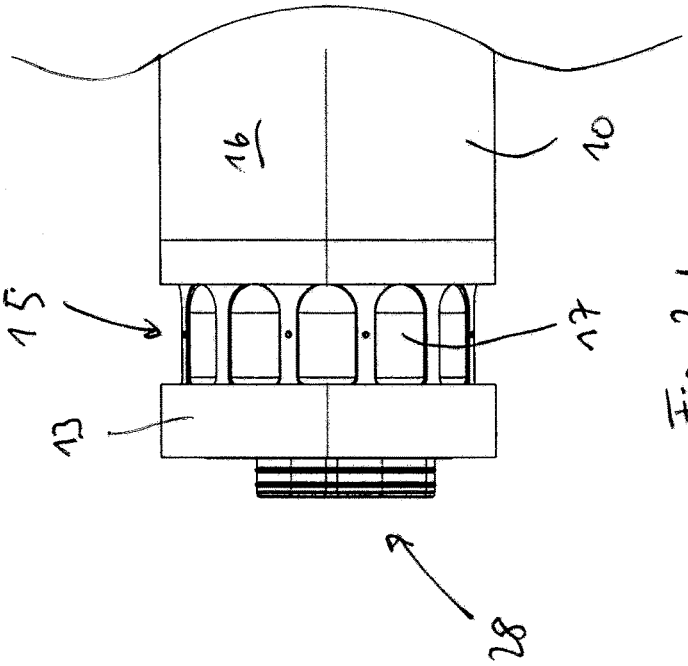

Fig. 2d

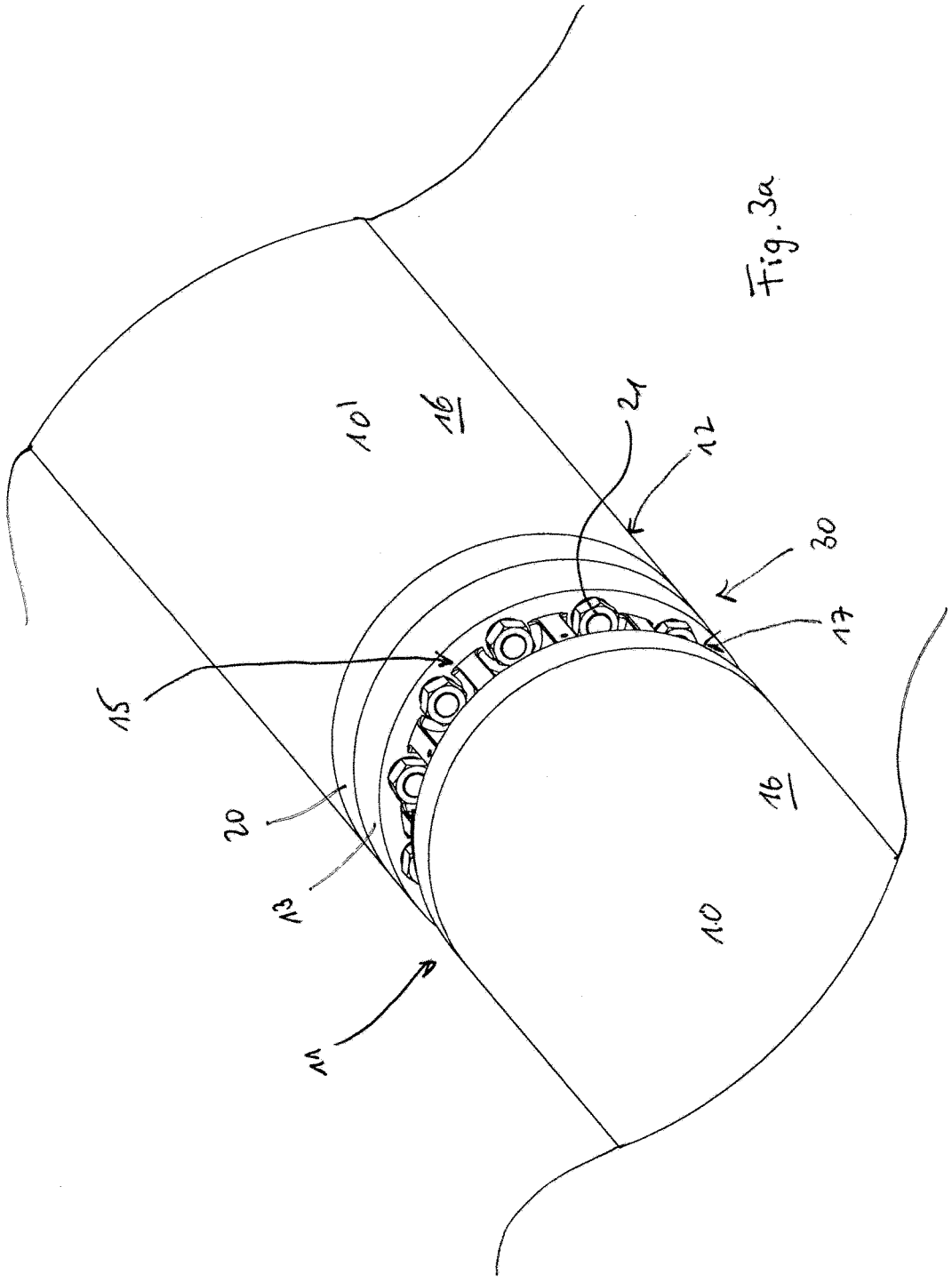

Fig. 3a

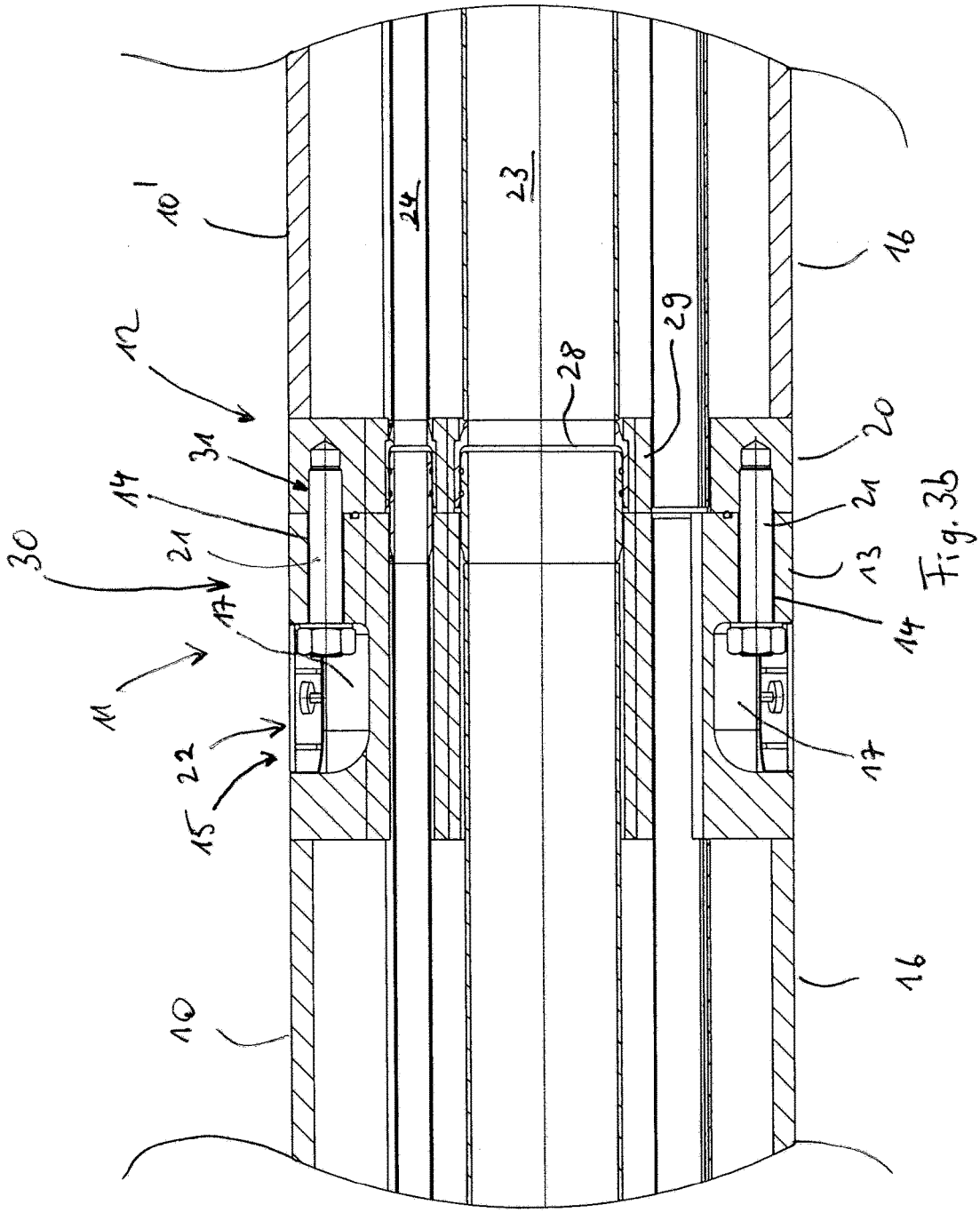

Fig. 3b

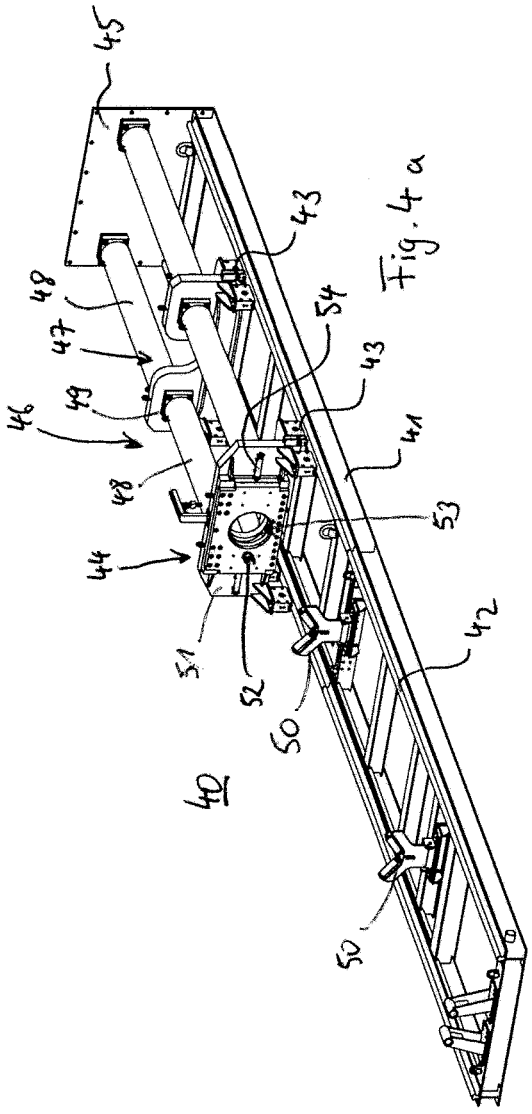
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Fig. 4a

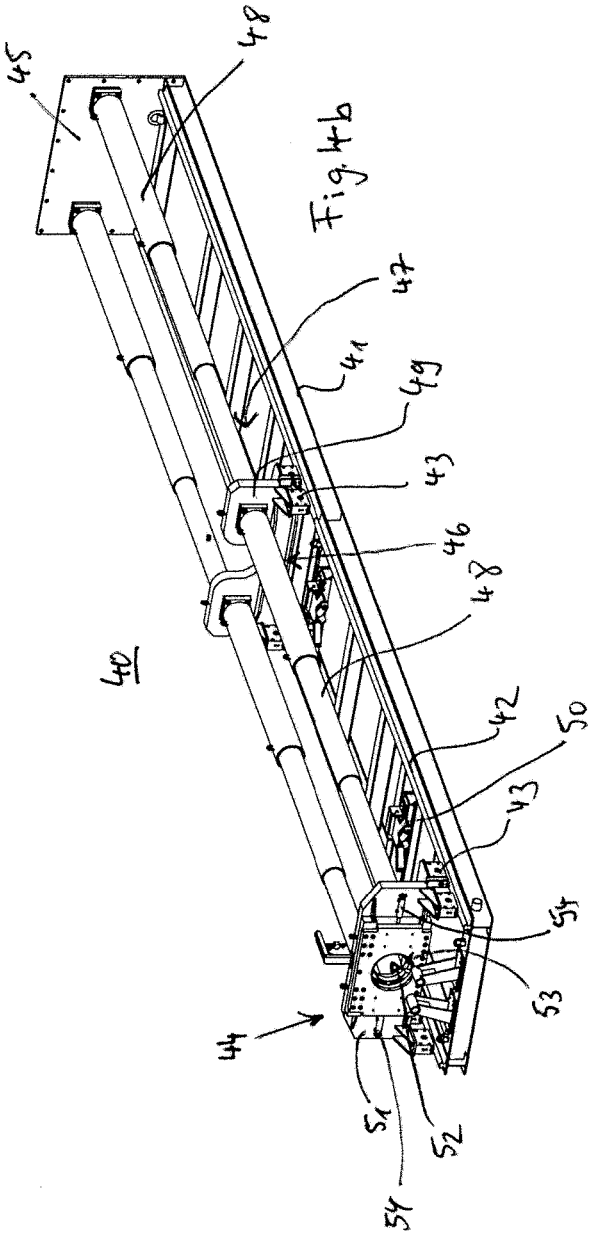
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Fig. 4b

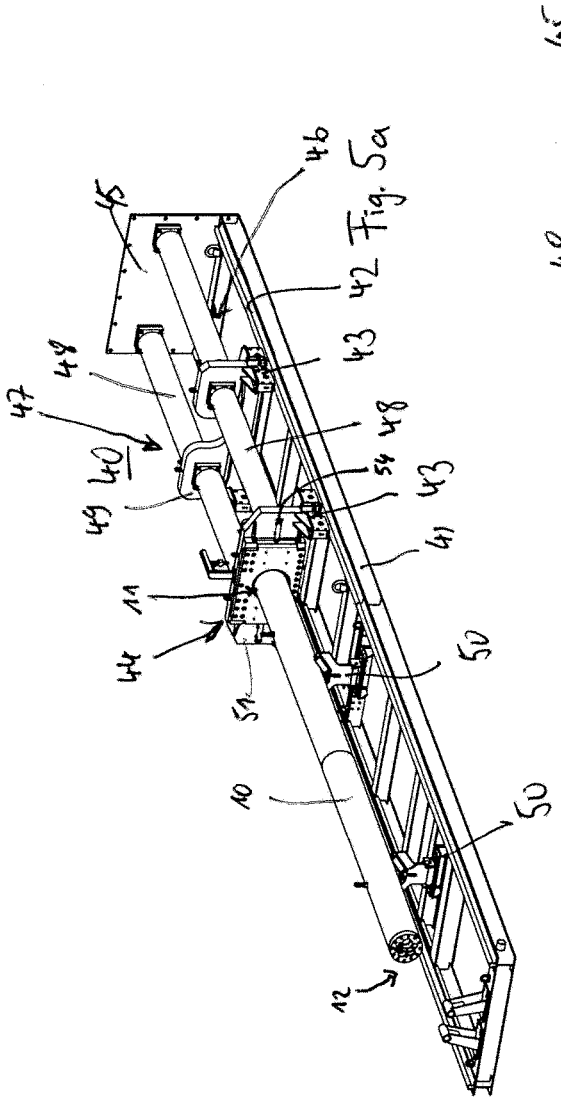
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Fig. 5a

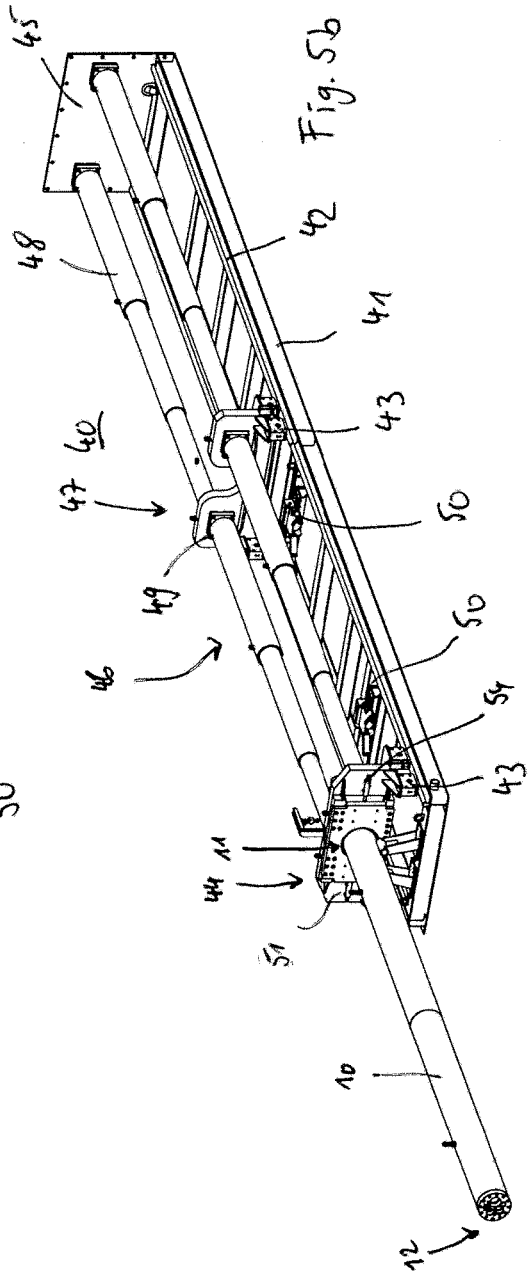
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Fig. 5b

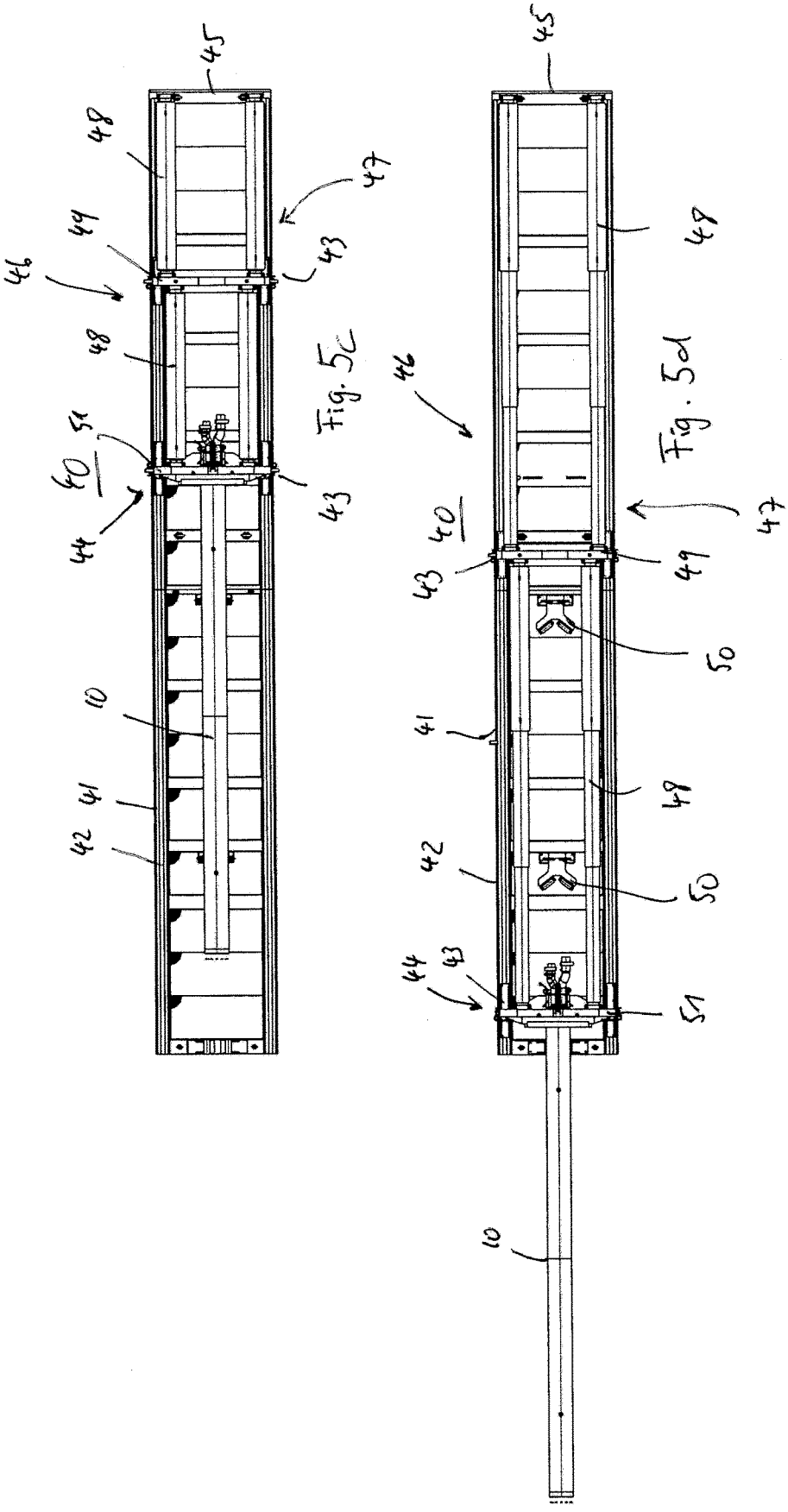
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Fig. 5c
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Fig. 5d

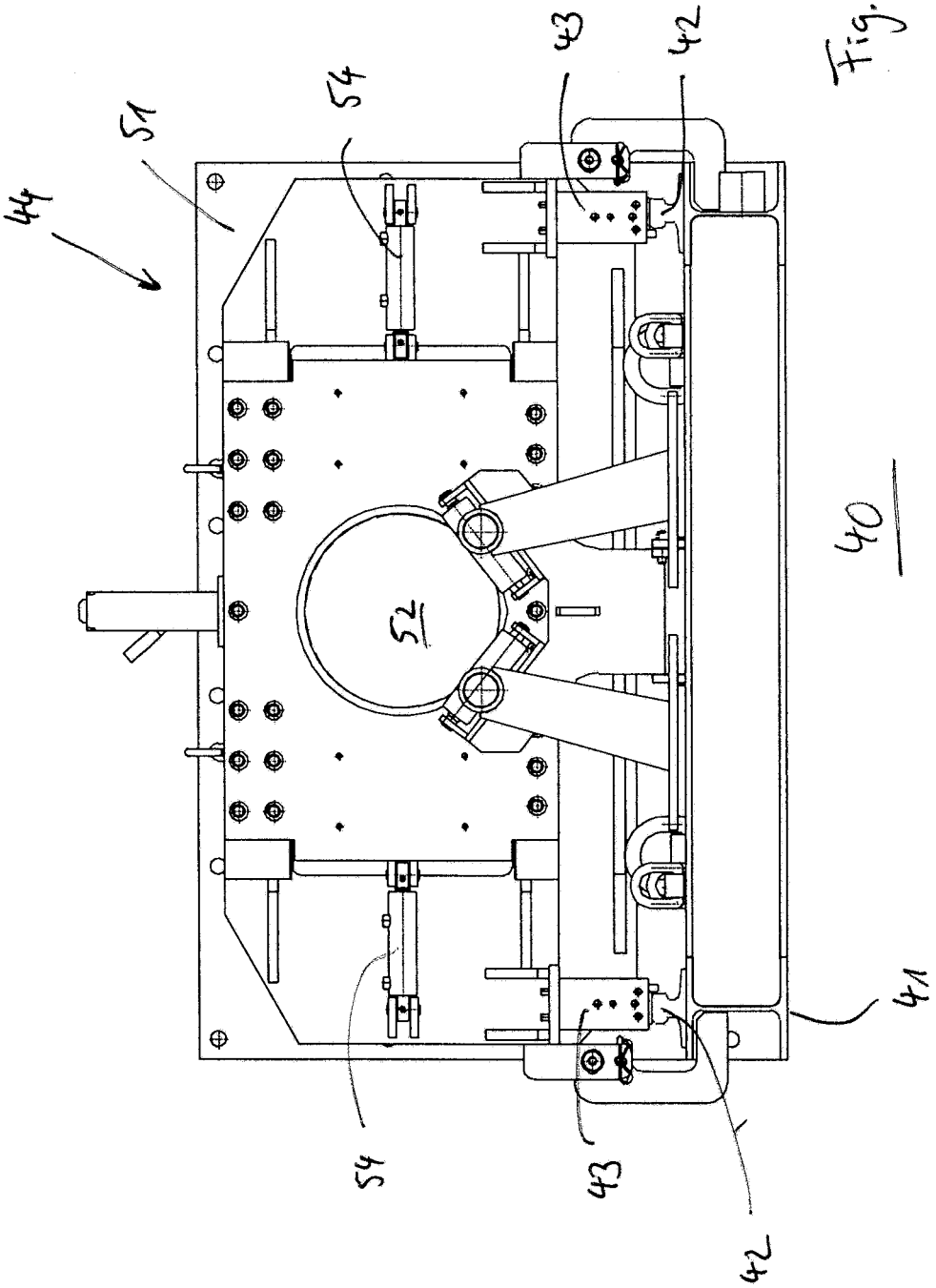


Fig. 6a

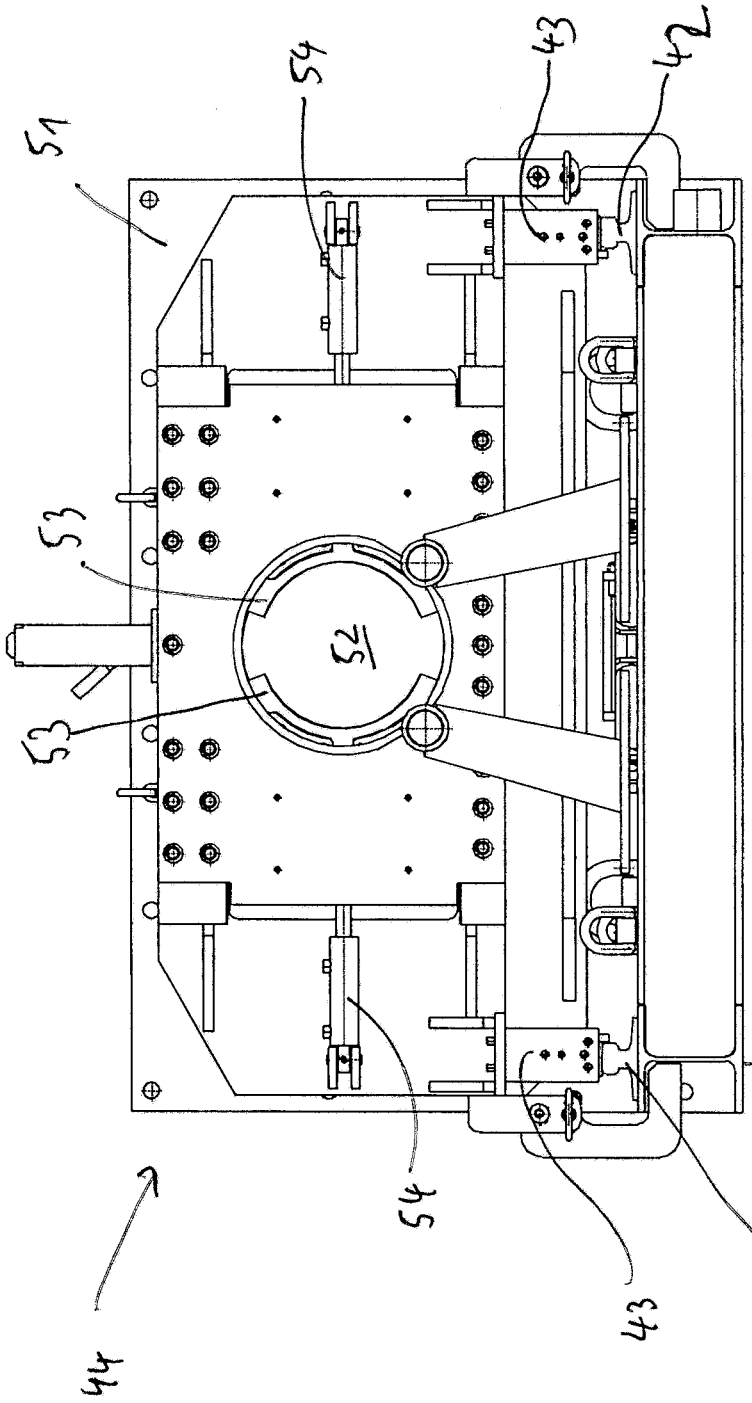


Fig. 6b

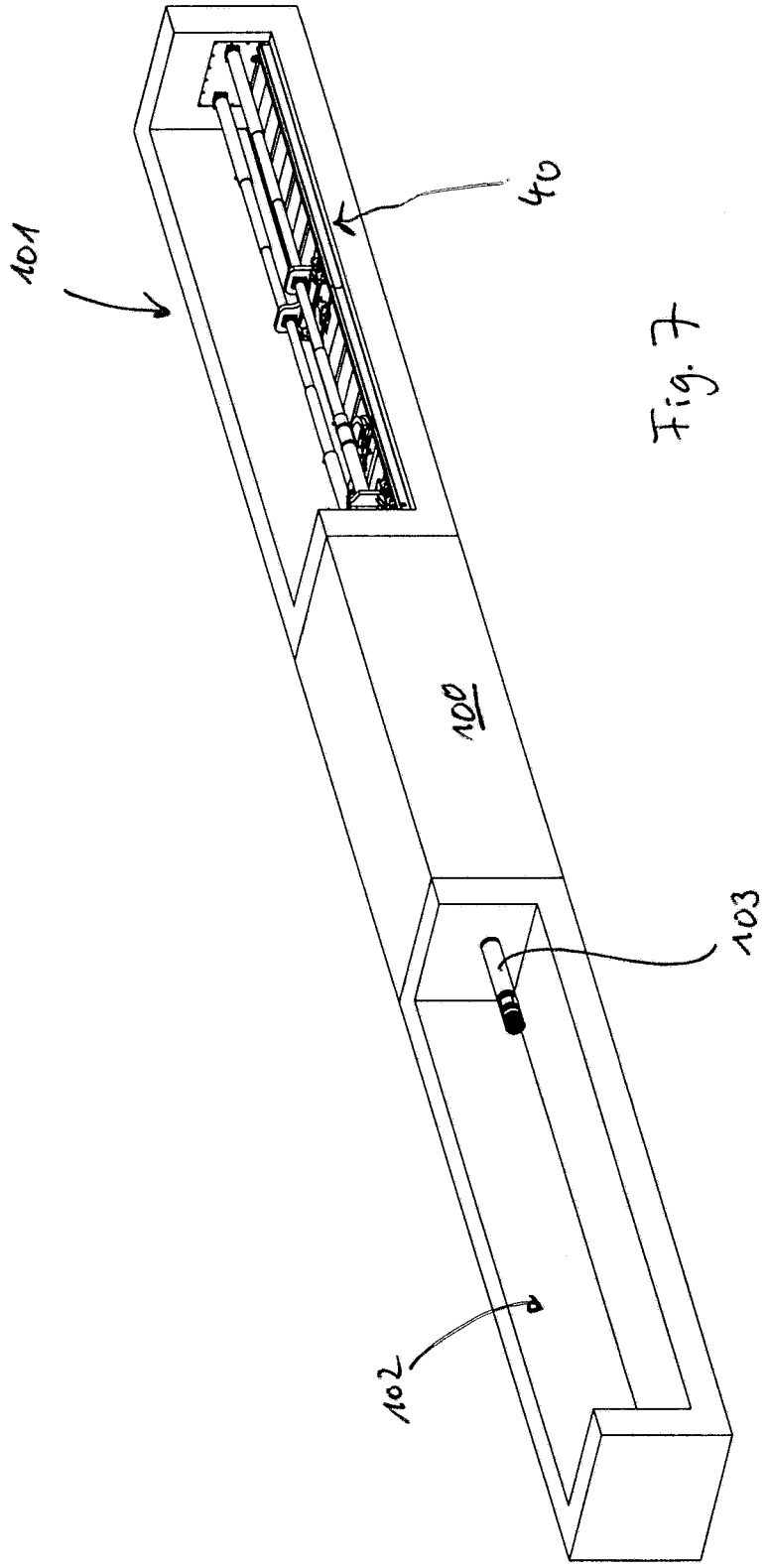


Fig. 7

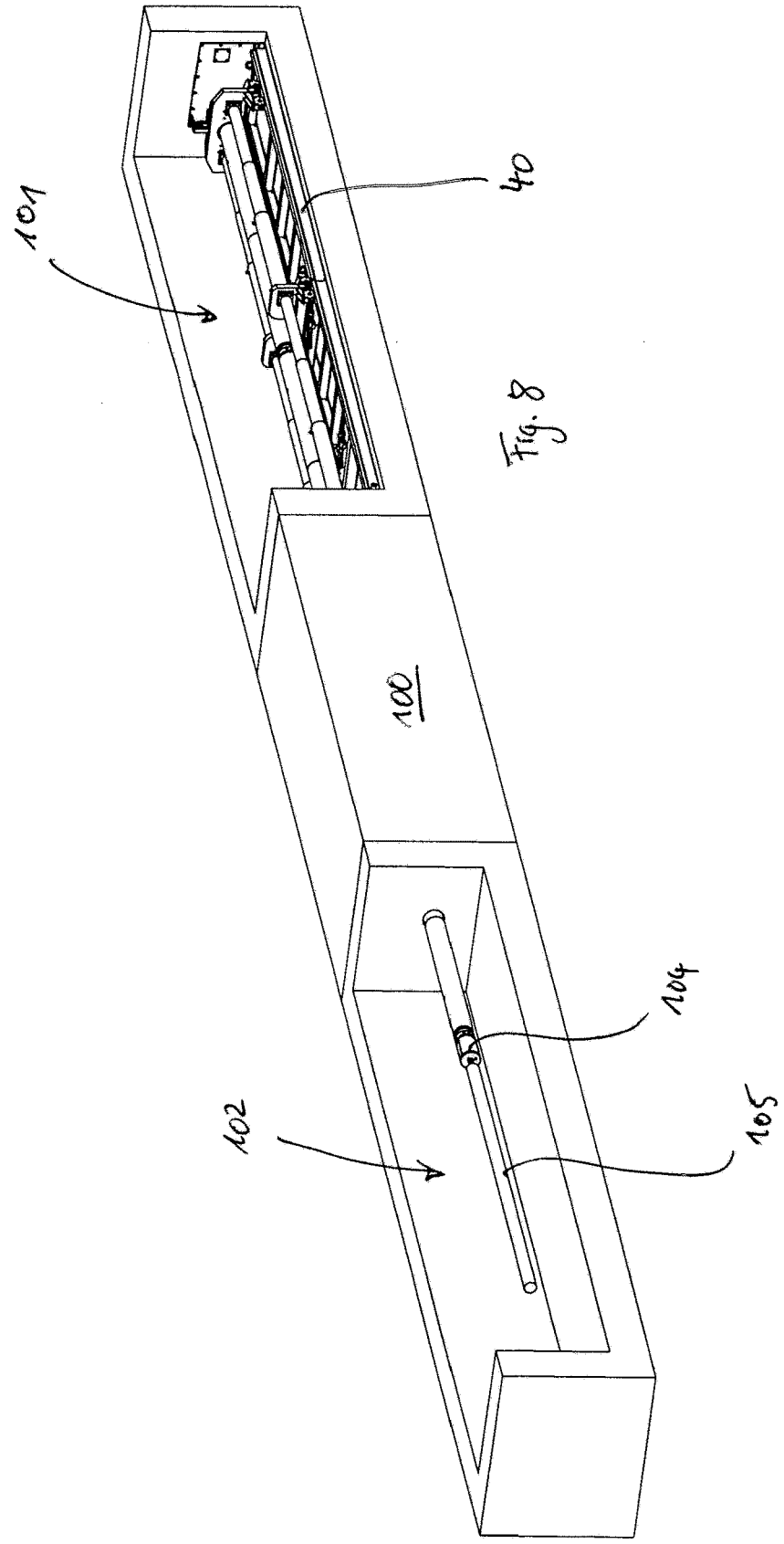
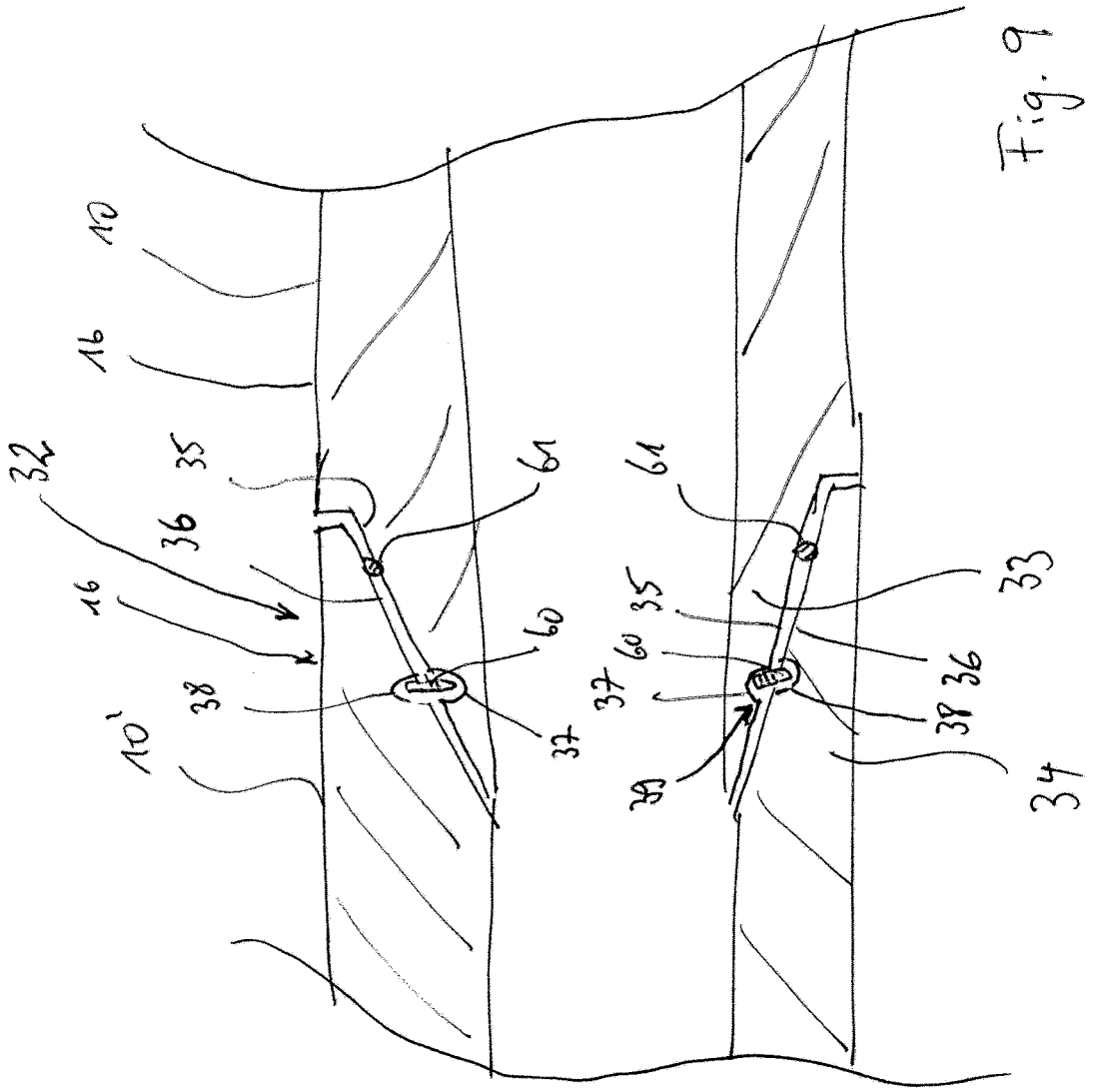


Fig. 8



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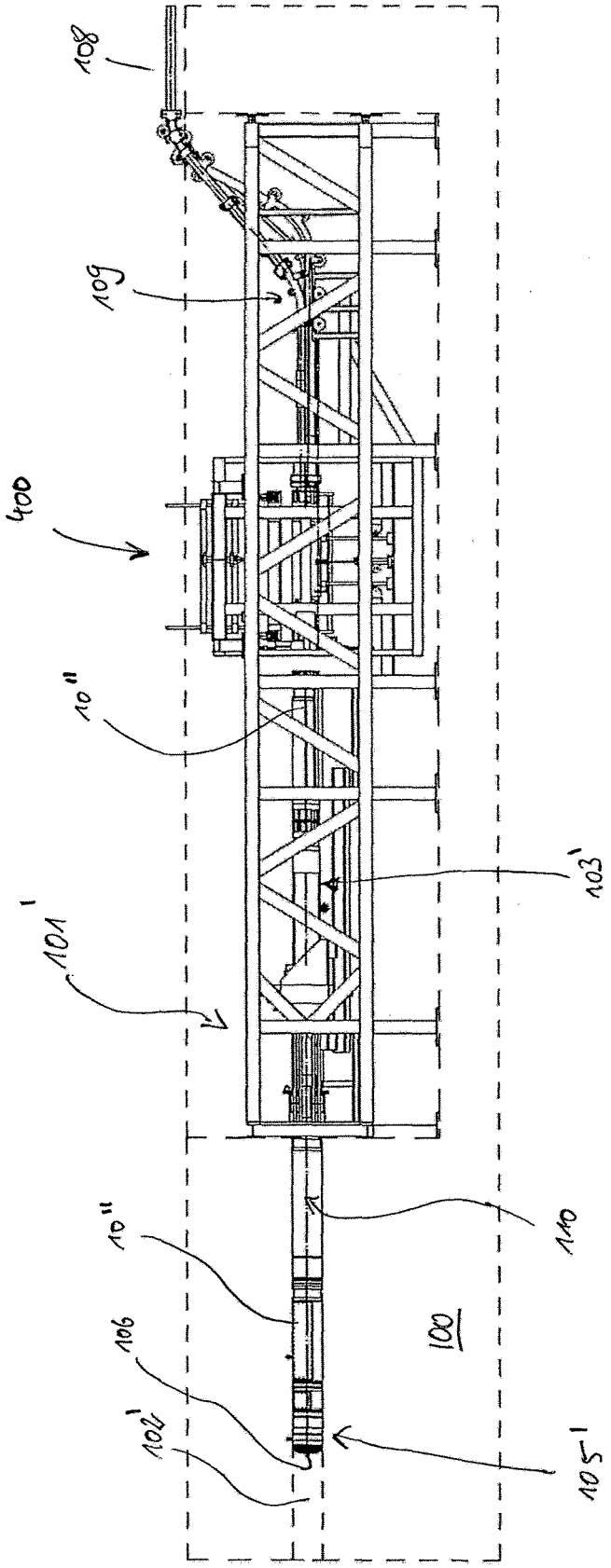

Fig. 10

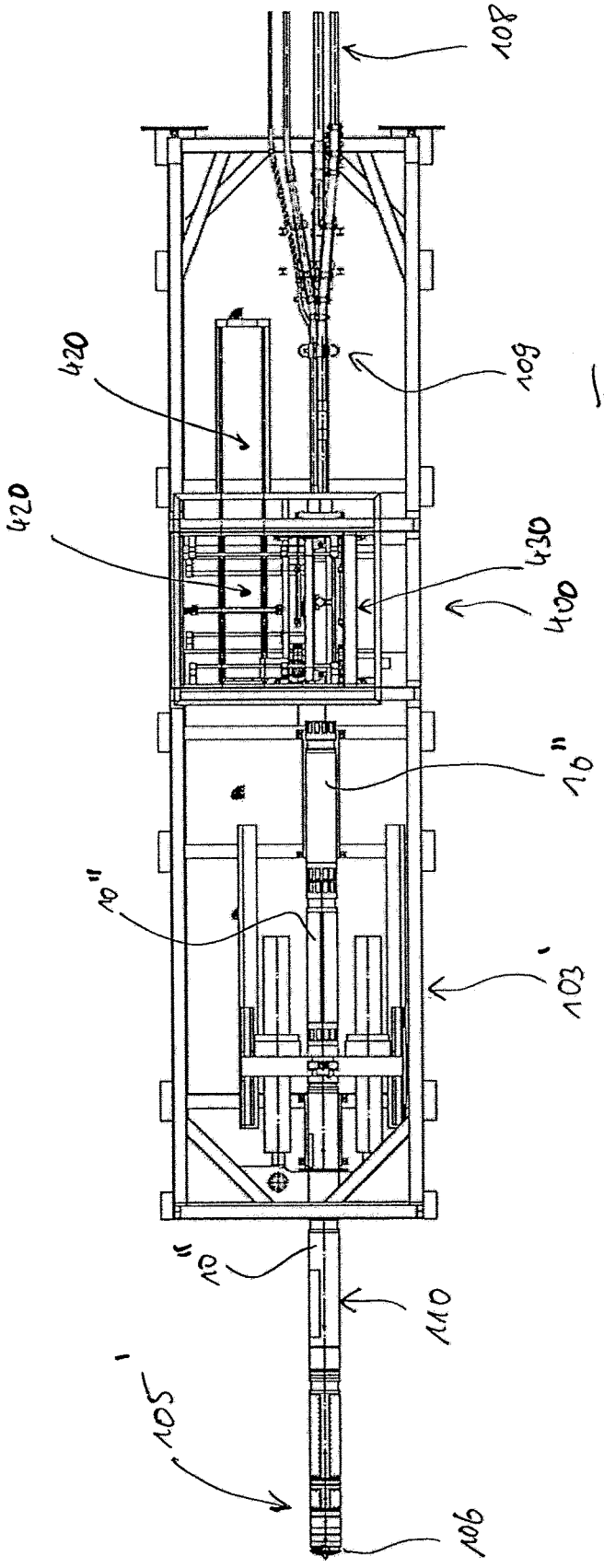

Fig. 11

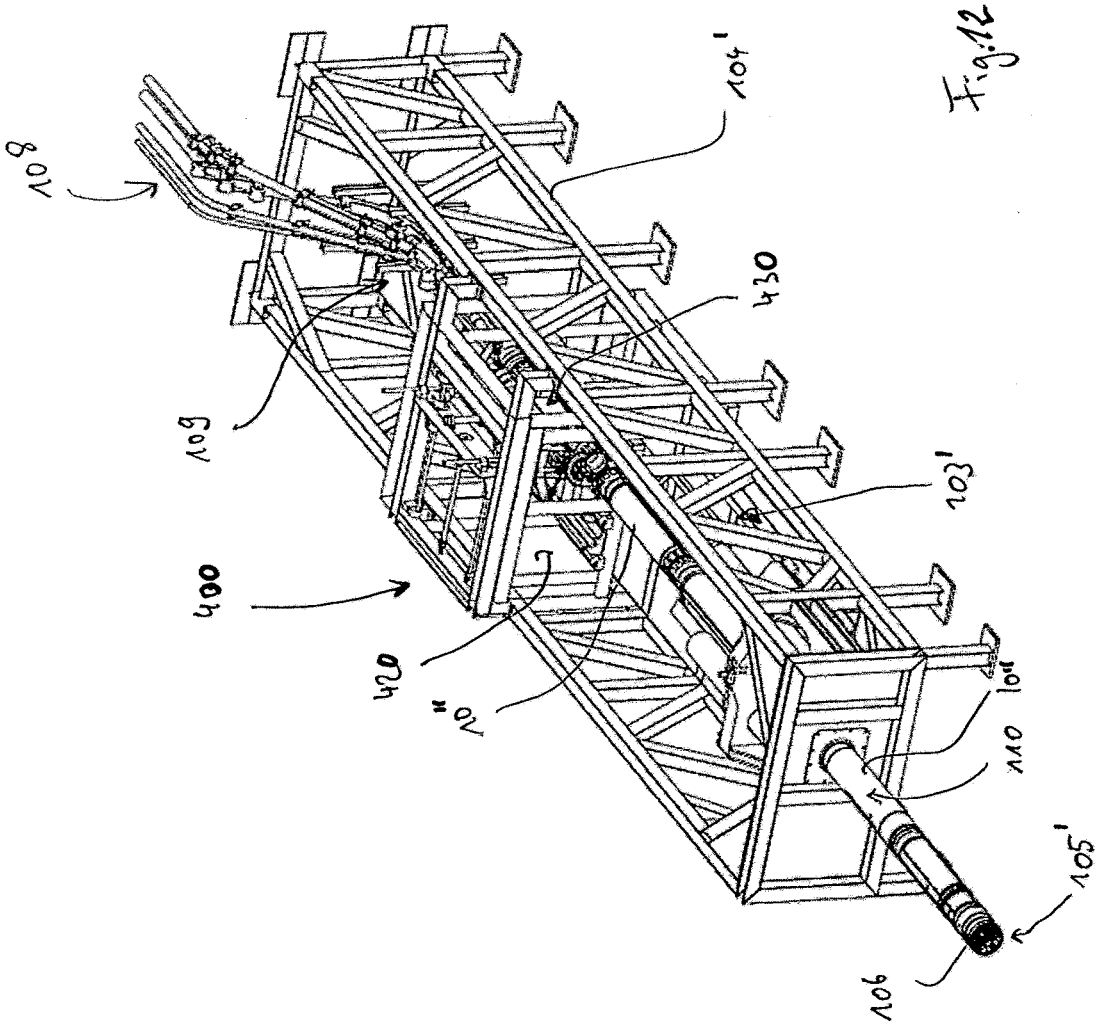

Fig.12

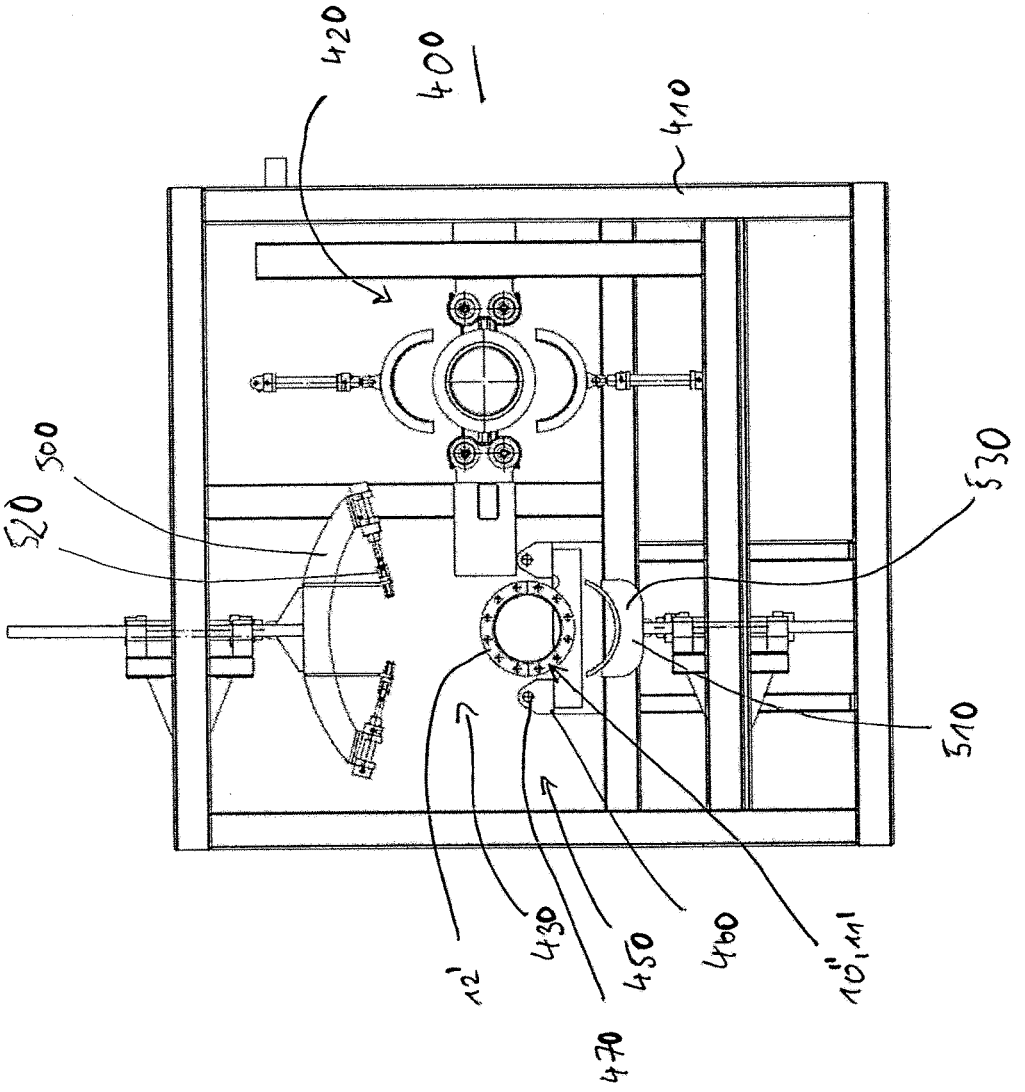

Fig. 13

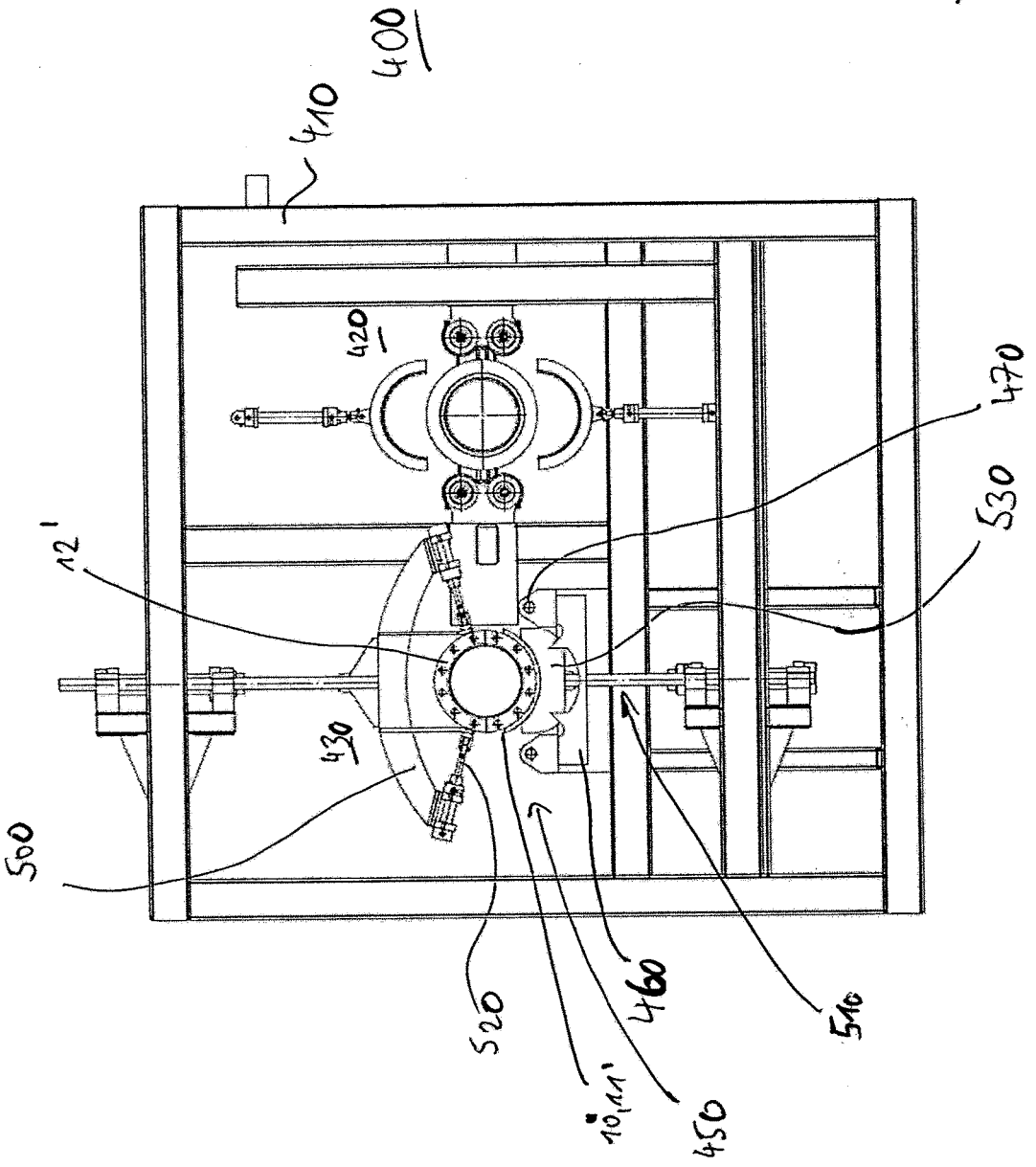

Fig. 14

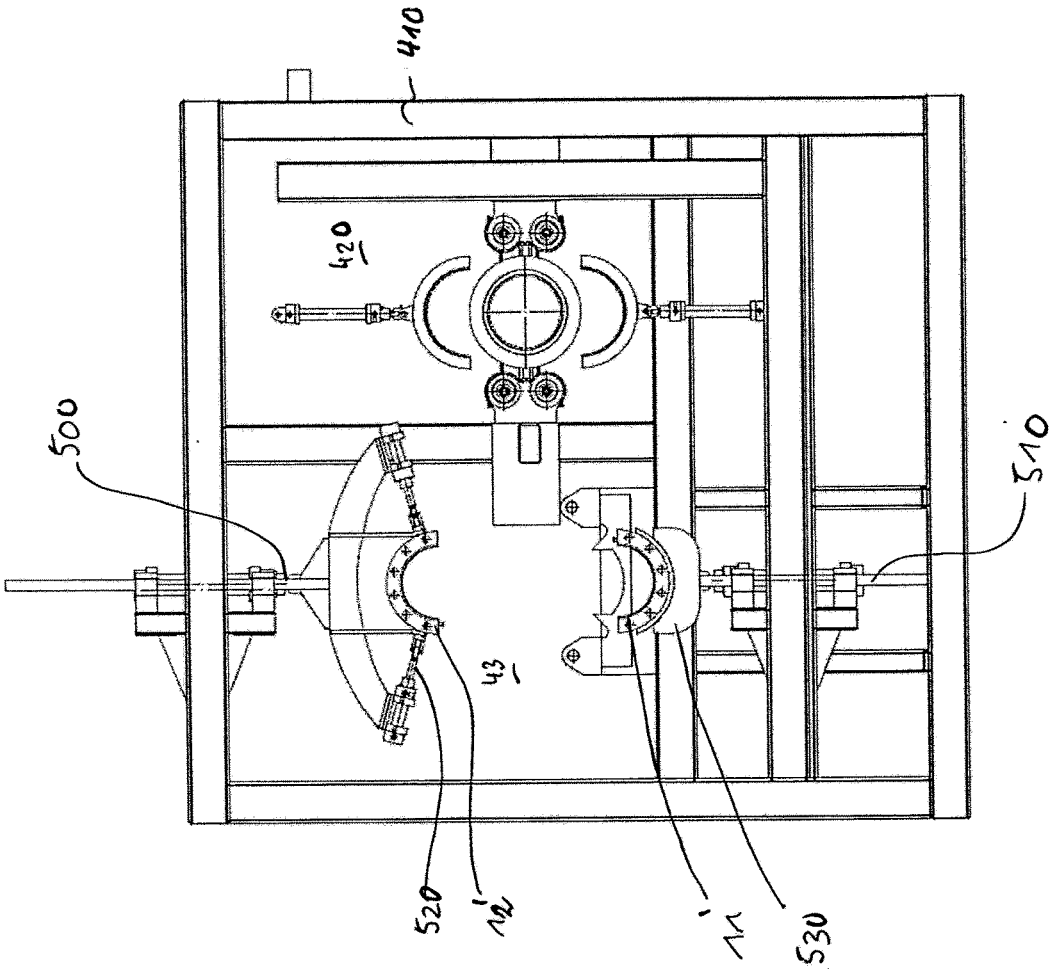

Fig. 15

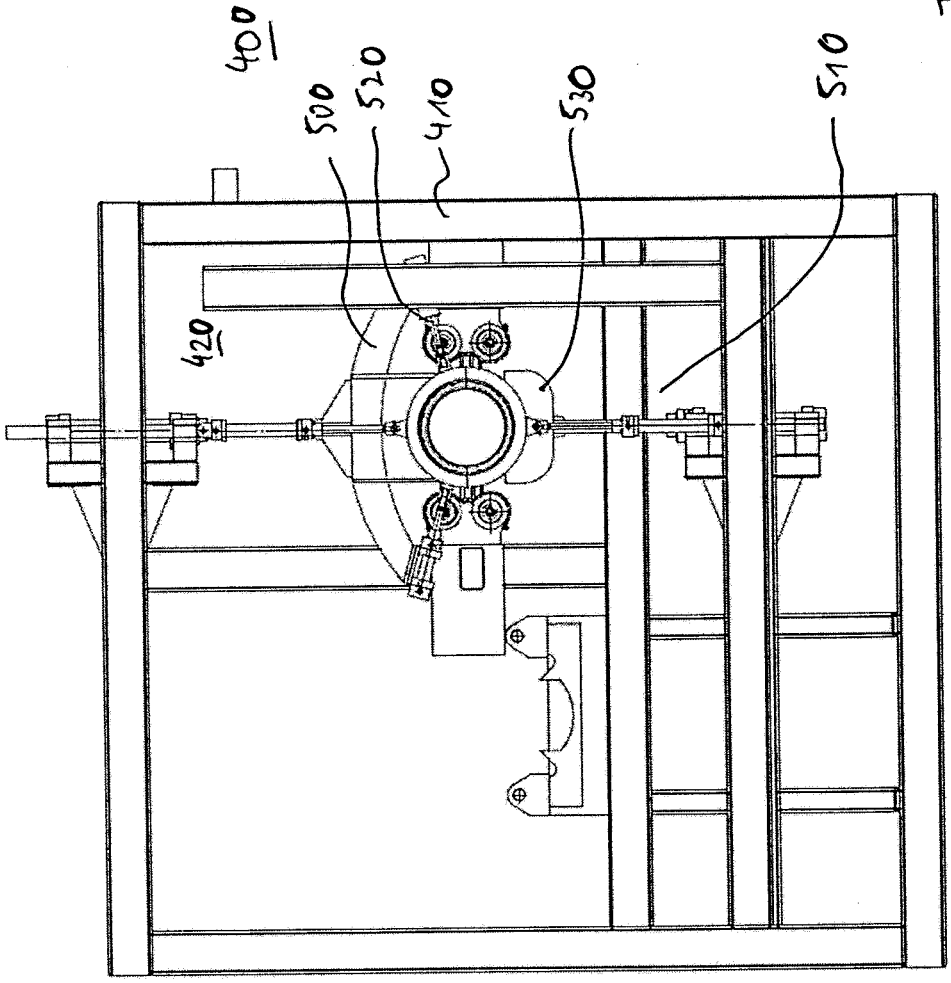

Fig. 16

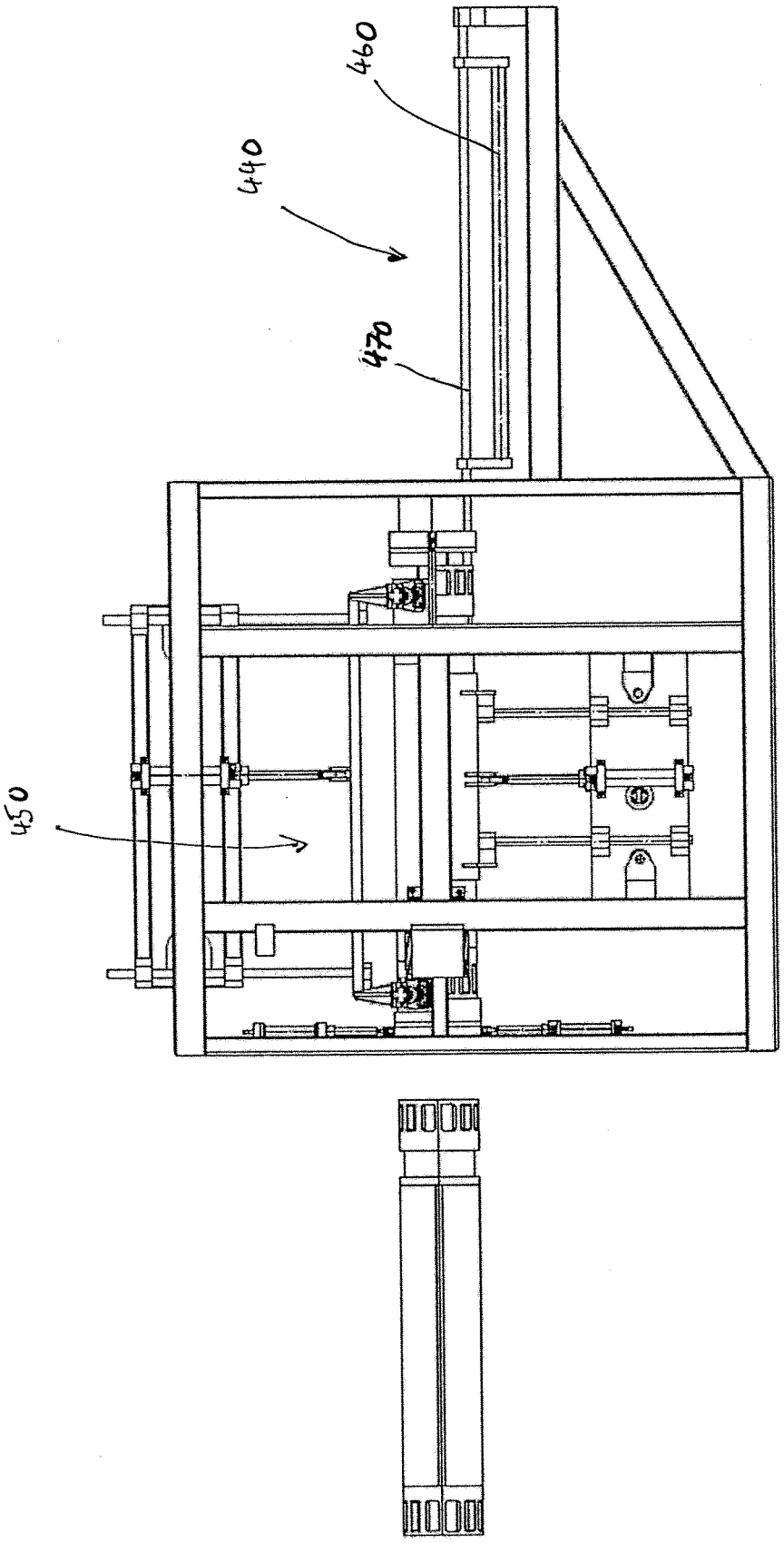

Fig. 17

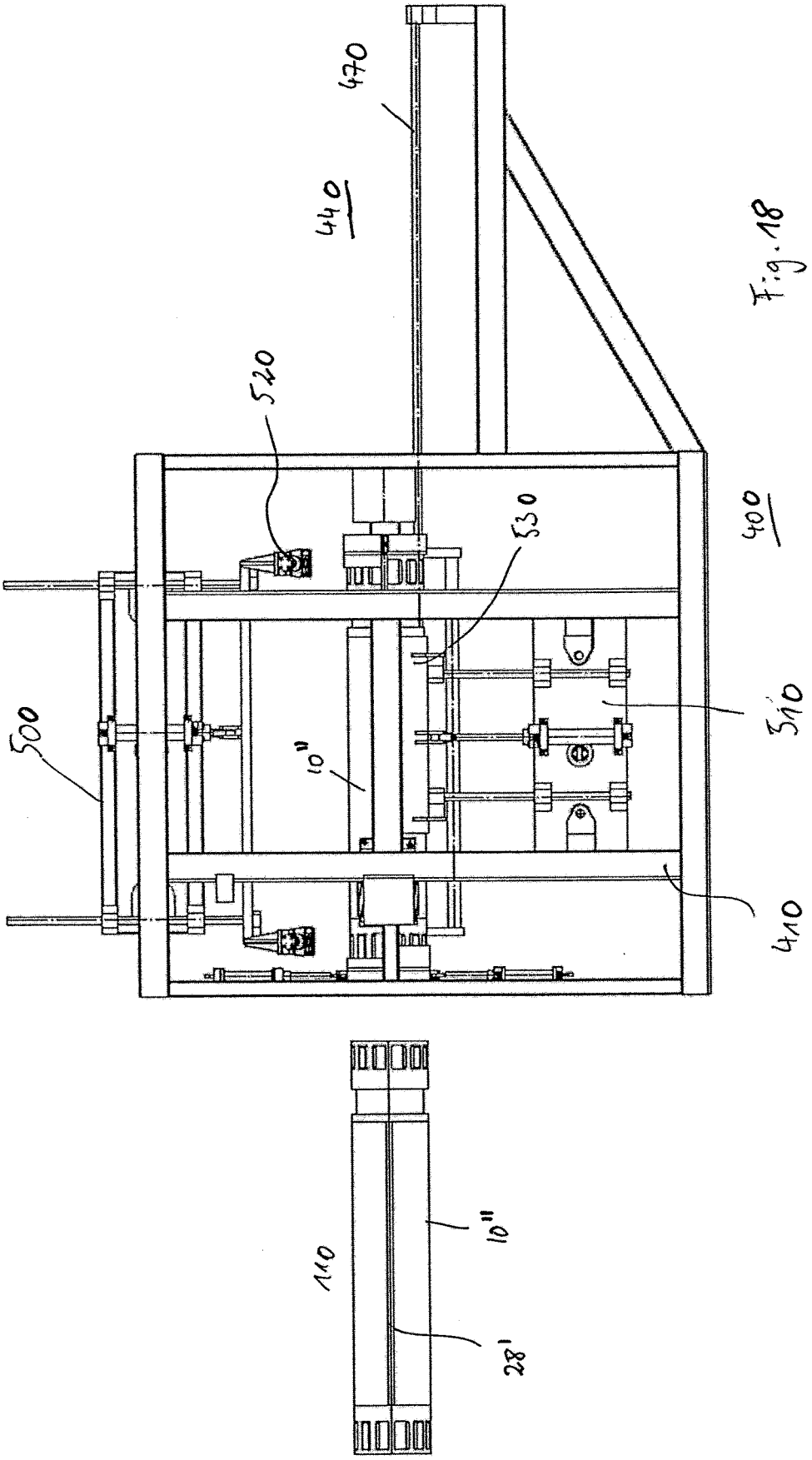

Fig. 18

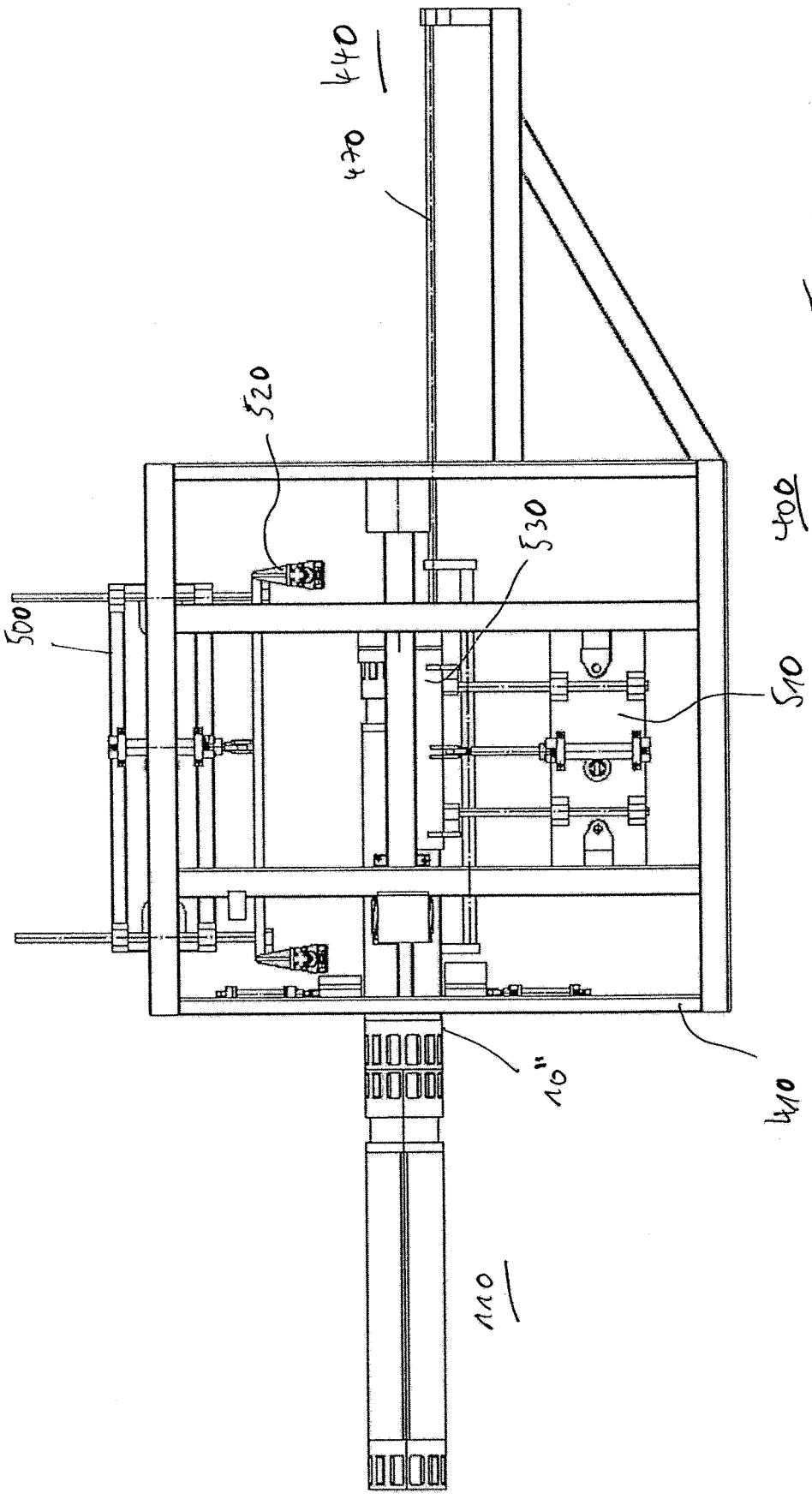

Fig. 19

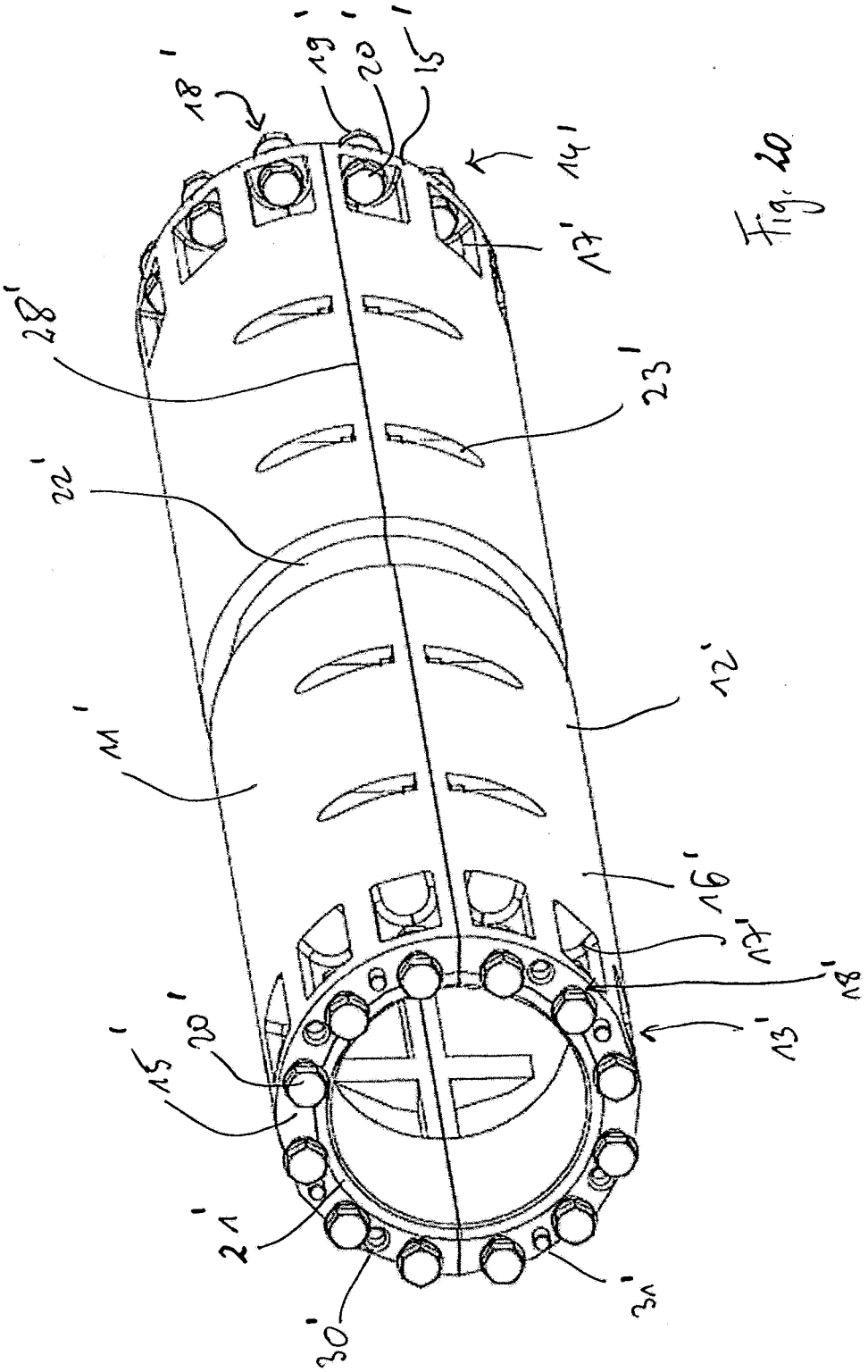

Fig. 20

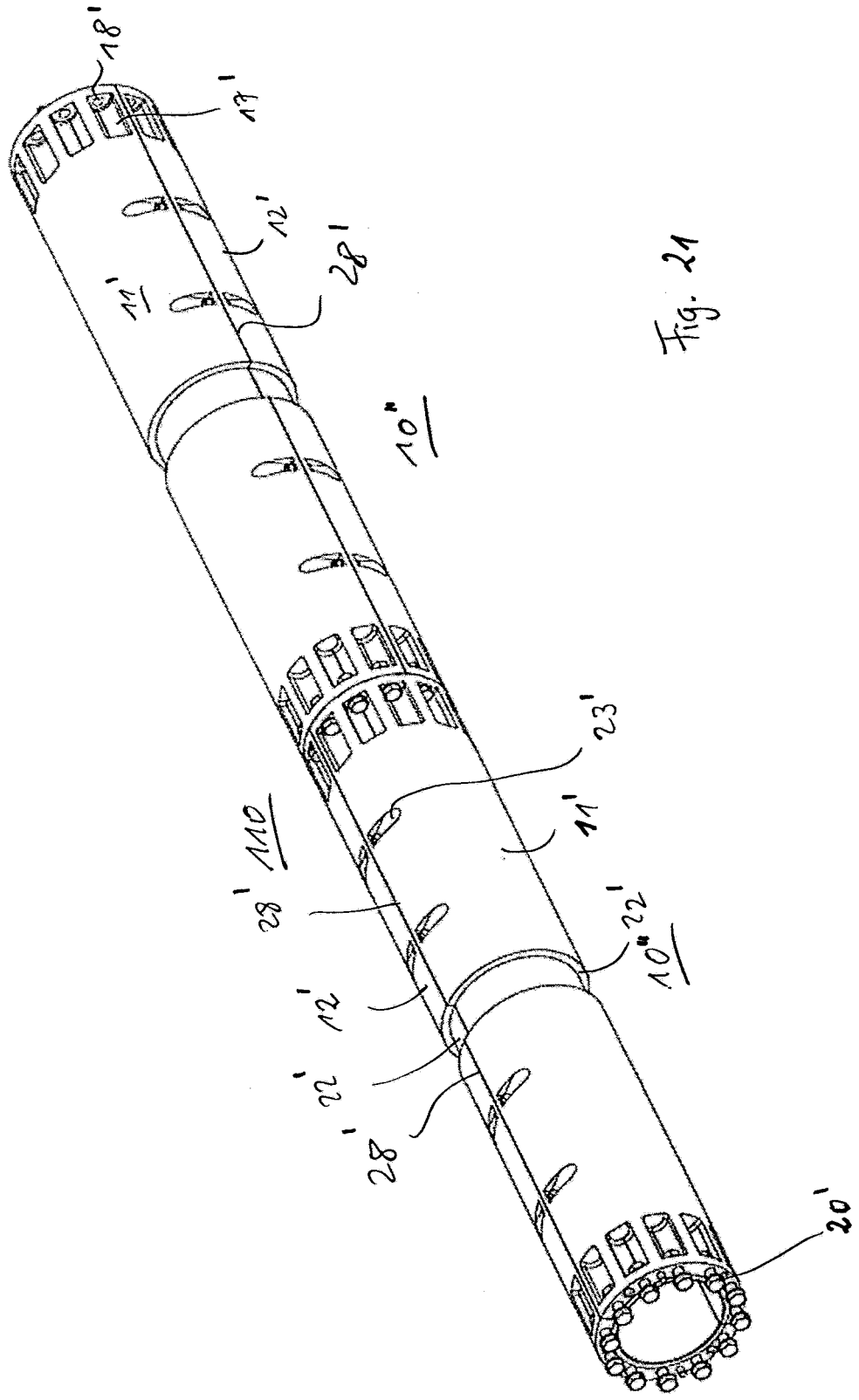

Fig. 21

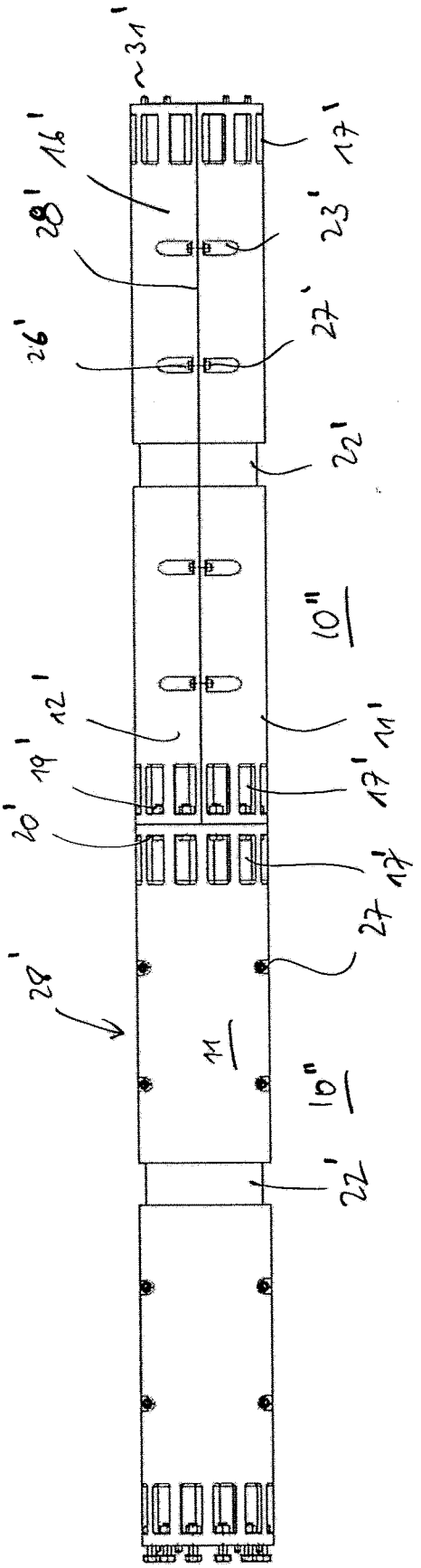

Fig. 22

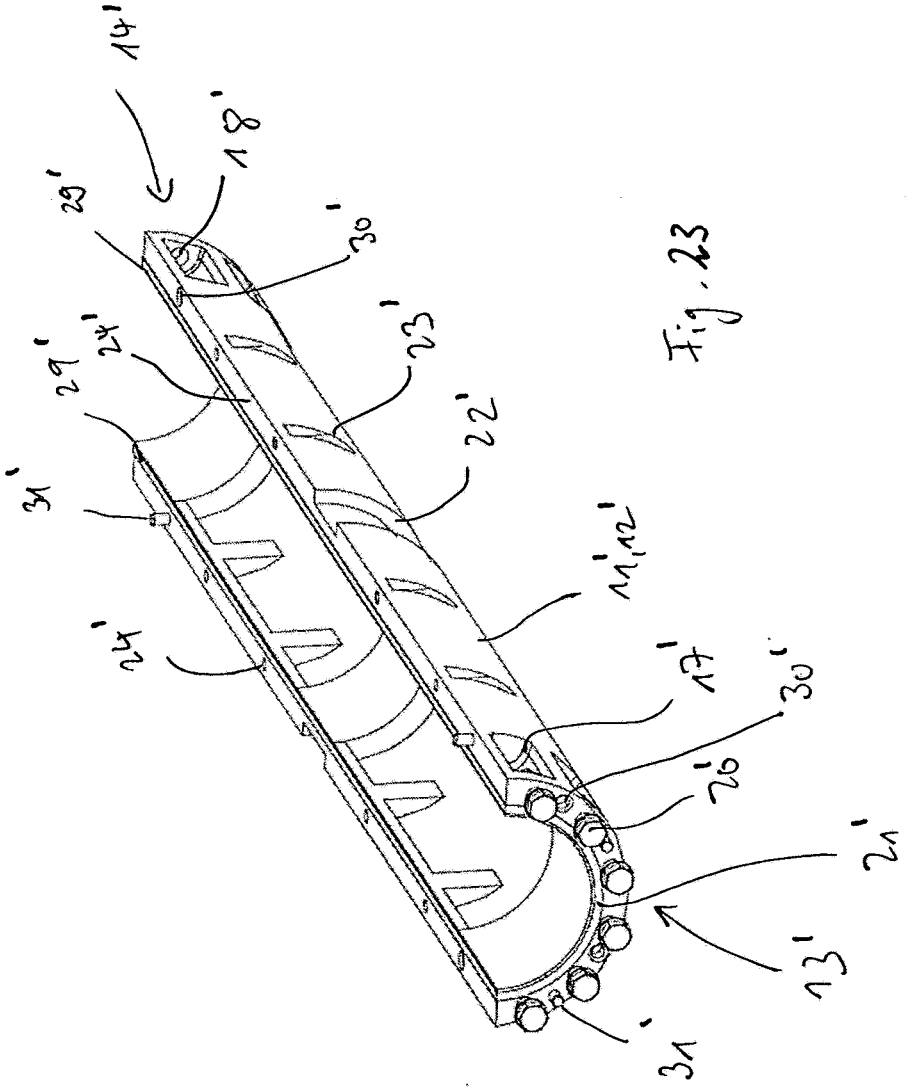

Fig. 23

DRILL PIPE, AND SYSTEM AND METHOD FOR LAYING A PIPELINE

[0001] The invention relates to a drill pipe for use during the creation of a borehole in a ground from a starting point to a target point along a predetermined drill line, in particular for the near-surface laying of underground cables or underground lines in the ground, wherein the borehole is gradually created by means of a drilling device that has a drilling tool for loosening the ground when the drill pipes are advanced. Furthermore, the invention relates to a device for moving at least one drill pipe into a borehole or out from it, especially during the near-surface creation of a borehole in a ground from a starting point to a target point and/or when placing a pipeline or underground line or an underground cable in the ground from a starting point to a target point or vice versa, with at least one base, with at least one abutment, with at least one actuator for moving the at least one drill pipe, being operatively connected to the base, with a transmission element, being operatively connected to the actuator, for transmitting the movement produced by the at least one actuator to the at least one drill pipe, as well as a system and a method for the creation of a borehole in the ground from a starting point to a target point along a predetermined drill line, in particular for the near-surface laying of underground cables or underground lines in the ground, wherein the borehole is gradually created by means of a drilling device that has a drilling tool for loosening the ground when the drill pipes are advanced.

[0002] When erecting a power supply grid, for example when creating a 380 kV line, besides the creation of overhead power lines it is also necessary to lay these lines in the ground.

[0003] The open ditch method is used during a near-surface laying of underground cables, underground lines and also conduits (such as pipelines). This sometimes causes substantial operations along the route and involves an expense which should not be underestimated for ditch excavation and refilling. For example, in the construction of a 380 kV cable route there are needed two ditch profiles, each with 5.5 m width and 2.15 m depth. The separation of the individual soil layers has proven to be especially complicated, requiring several separate clamps. This is necessary in order to restore the soil quality to the original state during the later refilling of the ditch. Furthermore, a construction service area of around 40 m must be kept open during the construction work, while after completion of the construction work a cable protection zone of around 23 m must be kept accessible. These operations during the construction phase and the impact after completion of the work in the context of open laying of cable justify the need to develop a suitable underground laying method.

[0004] Furthermore, in order to limit the intrusions into nature during the construction phase and keep down the construction costs, it is necessary to achieve large reach lengths. Reach lengths of up to 1500 m or more are desirable here. The problem with near-surface laying is the slight coverage of the line and sometimes also the slight distance between the individual boreholes (both of which may be only 2 to 6 m). The diameter of the lines being laid here is in a range of less than 500 mm, often also less than 300 mm.

[0005] Ditch-less drilling methods are already available from pipeline construction. (microtunneling, HDD), but heretofore it has not been possible to easily satisfy the necessary parameters with these methods.

[0006] Thus, drilling methods already exist which can lay the desired diameter range, but for technical reasons these methods are limited to much shorter laying lengths, especially due to the supplying of drill fluid. For example, the microtunnel drilling technique is up to 300 mm. For a reach length of up to or more than 1.5 km, it has still been necessary to resort to a microtunnel drilling technique with a diameter of around 1000 mm. However, with increasing diameter the space required for the construction zone layout and the costs increase significantly. Therefore, so far this technique has not been economically feasible. Moreover, the pipelines of the microtunnel drilling technique are only plugged together, so that only compressive but no tensile forces can be transmitted.

[0007] With the Horizontal Directional Drilling (HDD) method, a laying would be conceivable in regard to the requirements for the diameter and the reach length. This method is already being used in particular for crossing under rivers and roads. In this method, a pilot borehole is first made, using a rotating drill head and drill string, from the starting point in the direction of a target point. The position accuracy is ensured by a measurement system, which is arranged behind the drill head. The removed material is delivered to the surface with a bentonite suspension. The bentonite suspension is pumped through the drill string directly to the nozzles arranged at the drill head. The suspension mixes with the loosened soil and flows back through the annular space between drill string and ground to the starting point. However, large flushing pressures are needed for a clean removal of the loosened ground. But in order to prevent an unwanted emergence of the flushing on the surface, in the HDD method as well laying depths and thus coverages of more than 30 m are required. The drill pipes of the pilot drill string are coupled together by a non-positive locking connection by the drill pipes being screwed together directly by a screw thread connection. This also provides the connection to the drive unit of the so-called HDD rig. The screwing together of the drill string elements accordingly requires set-up time.

[0008] Thanks to developments in the field of drilling and pumping techniques in regard to the supplying of the drilling device with driving and flushing fluid, it has become possible to overcome the 1000 mm diameter barrier for the use of microtunneling methods, for example. However, the successive installing of drill pipes is a problem in regard to the regular extending of the supply lines for the drilling device and the transporting away of the drill cuttings. This involves significant loss of performance due to set-up times for laying lengths of up to or more than 1500 m.

[0009] Furthermore, in regard to the laying of near-surface lines it is necessary, after or during the producing of the borehole, to introduce a pipeline into the ground, especially one made advantageously of plastic (other materials such as polymer concrete, glass fiber plastic or the like are also possible) in order to then lay the conduit inside it. The problem here is that it is not easily possible to create the borehole directly with the introducing of plastic pipes in the ground, since the plastic pipe especially in the case of long laying lengths is not suited to transmitting the necessary forces without damage. It is therefore necessary to use drill pipes which are suited to providing the necessary forces required for the drilling. Here, once more, the above-described problem of successive inserting occurs.

[0010] After reaching the target point, the drilling device is removed. Furthermore, the drill pipes laid are removed once more and the plastic pipe is placed in the ground at the same time or after a delay. It is necessary to transmit tensile forces onto and across the drill pipes and accordingly once a drill pipe has been removed from the borehole it must be separated from the drill string in order to use it again.

[0011] The problem of the invention is therefore to overcome the aforementioned drawbacks, especially to reduce the set-up times and to make possible the transmitting of tensile forces in the drill string.

[0012] This problem is solved with respect to a first solution by a drill pipe in a first embodiment in that the drill pipe has at each of its ends at least one connection section for detachably connecting it to a further element of a drill string in a tensile-resistant manner, in that the drill pipe has at least one element for producing a tensile-resistant connection to a corresponding element of an advancing device for advancing the drill pipe into and/or retracting it from the borehole, and in that an outer wall of the drill pipe is made in one piece.

[0013] Surprisingly, it has been found that a tensile-resistant drill string can be produced with such a drill pipe in a simple manner, one which is designed to be advanced and/or retracted.

[0014] Another solution of the problem with regard to the drill pipe in a second embodiment proposes that the drill pipe has at each of its ends at least one connection section for detachably connecting it to a further element of a drill string in a tensile-resistant manner, that the drill pipe has at least one element for producing a tensile-resistant connection to a corresponding element of an advancing device for advancing the drill pipe into and/or retracting it from the borehole, and that the drill pipe consists of at least two shell elements which are axially connectable to the drill pipe.

[0015] By dividing the drill pipe into shell elements it is possible to lay the supply lines of the drilling device, coupled together as a hose pack, in a lower portion of the shell elements and to close them with the other shell elements as a kind of lid. The supply lines may therefore be provided, for example, wound up on a drum over the full drilling length. Fragmenting of the supply lines during microtunneling is reduced or eliminated, which significantly decreases the set-up times.

[0016] Another teaching of the invention proposes that at least one connection region of a shell element is provided with at least one seal. In this way, pressure tightness of the drill pipe can be provided in a simple fashion.

[0017] Another teaching of the invention proposes that the connection by the respective connection sections of the drill pipe to another element of the drill string occurs in the form of a positive-locking and/or non-positive-locking connection. Another teaching of the invention proposes that the drill pipe has at its first end a first connection section and at its opposite second end a second connection section corresponding to the first connection section.

[0018] It is advantageous that the first connection section and the second corresponding connection section in the mounted state form a flange connection, having connection elements and/or boreholes for the placement of a bolt connection. In this way, a tensile-resistant connection between the drill pipes can be provided in a simple and economical manner.

[0019] Alternatively, it is advantageous that the first connection section and the second corresponding connection section form a tensile-resistant plug-in sleeve connection, wherein one connection section has a pointed end and the other connection section is a corresponding sleeve, each of them having at least one corresponding indentation in the opposite surface, which form a groove in the assembled state in which at least one shearing element can be inserted to produce the tensile-resistant supporting connection. Here as well it is possible in a simple manner to produce a tensile-resistant connection between the drill pipes. Surprisingly, it has been found that such a connection can also be used for drill pipes.

[0020] Another teaching of the invention proposes that the element for producing a tensile-resistant connection with the corresponding element of the advancing device is an indentation in the outer wall of the drill pipe. In this way, it is possible in an easy manner to enable a movement of the drill pipe via a movement device, such as a press frame for example, in a tensile-resistant manner and with substantially less set-up time.

[0021] Another teaching of the invention proposes that the indentation can be provided with a covering. This is advantageous for avoiding stones and the like from getting jammed in the indentation in the ground.

[0022] Another teaching of the invention proposes that the element for producing a tensile-resistant connection with the corresponding element of the advancing device is an element of a tensile-resistant plug-in sleeve connection. In this way, it is possible in an easy manner to enable a movement of the drill pipe via a movement device, such as a press frame for example, in a tensile-resistant manner and with substantially less set-up time.

[0023] Another teaching of the invention proposes that the drill pipe has at least one conduit section arranged in the outer wall and/or in the inner space of the drill pipe at the outer wall and extending in parallel along the outer wall, wherein the at least one conduit section has at each of its ends a connection element for producing a connection between conduit sections of interconnected drill pipes or elements of the drill string. The conduits serve for example for the transport of bentonite, as a driving line for the driving of a pump, as a feed line for transporting away the drill cuttings, for bringing in electrical lines, as a high-pressure conduit or as a delivery line for the mixture of washing liquid and drill cuttings/loosened soil. The conduits have, for example, a plug-in sleeve system, possibly with gaskets, so that the conduits can be plugged into one another. In this way, the set-up times for providing the supply lines can be substantially reduced.

[0024] Advantageously, the drill pipes according to the invention have a length of more than 8 m. This likewise significantly reduces the set-up times.

[0025] Another teaching of the invention proposes that the drill pipe has at least one indentation in its wall for producing a connection with an advancing device for advancing the drill pipe into and/or retracting it from the borehole. A positive locking can be implemented in this way for easier transmitting of advancing forces to the outer surface.

[0026] Another teaching of the invention proposes that at least one manipulating element has an element for producing a connection with a shell element, for example in the form of a gripping element, which preferably engages in an indentation in the surface of the shell element, a magnetic

element, or a suction or vacuum element. In this way, a supporting connection can easily be provided for the lifting of the shell element.

[0027] A further solution of the invention proposes in regard to the movement device that a guide element is provided which is movable relative to the base and operatively connected to the transmission element, that the transmission element has at least one positive-locking element for the transmission of the motion, being designed such that a tensile-resistant releasable connection exists between transmission element and drill pipe.

[0028] In this way it is easily possible to transmit tensile forces to the drill string on a drill string consisting of drill pipes, especially as previously described, among others.

[0029] Another teaching of the invention proposes that the at least one actuator is a hydraulic cylinder and/or a rack and pinion drive. Advantageously, they are simple actuators which are maintenance-free and able to provide the required forces.

[0030] Another teaching of the invention proposes that the positive-locking element has at least one engaging element which provides the tensile-resistant releasable connection by engaging with an engaging section of the drill pipe, preferably on its outer wall. Advantageously, the at least one engaging element is designed so that it encloses the drill pipe, wherein preferably the positive-locking element has at least two engaging elements, which are especially preferably arranged horizontally and/or vertically movable in the positive-locking element. In this way, a releasable connection for the force transmission which has low set-up time can be provided in an easy manner. In particular, the set-up time can be reduced significantly by a horizontal/vertical moving of the engaging elements.

[0031] Another teaching of the invention proposes that the at least one engaging element is a connection section corresponding to a connection section of the drill pipe. Advantageously, the connection sections form a tensile-resistant plug-in sleeve connection, wherein the engaging element has either a pointed end or a sleeve corresponding to the pointed end, each of them having at least one corresponding indentation in the opposite surfaces, which form a groove in the assembled state in which at least one shearing element can be inserted to produce the tensile-resistant supporting connection. In this way, a releasable connection for the force transmission which has low set-up time can be provided in an easy manner. In particular the set-up time can be reduced significantly by inserting and removing the at least one shearing element.

[0032] Another teaching of the invention proposes that a starting seal is provided, preferably in connection with the base.

[0033] Another solution of the invention proposes a device for the mounting of a drill pipe as described above for use during the creation of a borehole in the ground from a starting point to a target point along a predetermined drill line, in particular for the near-surface laying of underground cables or underground lines in the ground, wherein the borehole is gradually created by means of a drilling device that has a drilling tool for loosening the ground when the drill pipes are advanced, with a feed area for the shell elements, with a mounting area for connecting the shell elements, with manipulating elements for receiving, moving and positioning the shell elements in the mounting area, with at least one advancing element and/or at least one rotating element for the positioning of the shell elements in the mounting area.

[0034] Another teaching of the invention proposes that the shell elements are positionable about a supply line of the drilling device.

[0035] Another teaching of the invention proposes that has at least one manipulating element with a gripping element for producing a connection with a shell element, which preferably engages in an indentation in the surface of the shell element.

[0036] Another teaching of the invention proposes that the manipulating elements are horizontally and vertically movable, so that the shell elements are movable from the feed area to the mounting area.

[0037] Another solution of the invention proposes in regard to the system that the drill pipes are the drill pipes described above, and an advancing device as described above is provided for the moving of the drilling device by the advancing of the drill string.

[0038] Advantageously, when using the two-piece drill pipes, a device as described above is provided for the mounting of a drill pipe.

[0039] Another teaching of the invention proposes that the drill pipes are arranged in the drill string such that the axial connection regions of the shell elements are arranged offset relative to each other.

[0040] Another solution of the invention proposes in regard to the method that the previously described drill pipes are used, which are moved in the borehole, mounted on a drill string, by means of an advancing device as described above.

[0041] Advantageously, when using the two-piece drill pipes, a device for the mounting of a drill pipe is used as described above.

[0042] Another teaching of the invention proposes that the drill pipes are arranged in the drill string such that the axial connection regions of the shell elements are arranged offset relative to each other.

[0043] The above-described solutions of the invention are not limited to the near-surface laying of pipelines, underground cables or underground lines in the ground. Instead, the aforementioned problem can likewise be employed in classical microtunneling with large diameters, for example with concrete pipes. Here as well, the solutions according to the invention can significantly reduce the set-up times and substantially eliminate lengthening the supply lines and installing advancing pipes in the drilling area with respect to installations and supply lines.

[0044] Furthermore, the drill pipe may also be a product pipe at the same time, which as such remains in the ground and does not have to be removed again from the ground for the pulling in of the product pipe.

[0045] The invention shall be explained more closely below with the aid of an exemplary embodiment in connection with a drawing. There are shown:

[0046] FIG. **1**A, **1**B a side view of a first embodiment of a drill pipe according to the invention,

[0047] FIG. **2**A a first connection section of the drill pipe according to the invention,

[0048] FIG. **2**B a second connection section of the drill pipe according to the invention,

[0049] FIG. **2**C the connection section of FIG. **2**A without covering,

[0050] FIG. **2**D a side view of FIG. **2**C,

[0051] FIG. **3**A the connection section of two interconnected drill pipes according to the invention,

[0052] FIG. **3**B a side view of FIG. **3**A,

[0053] FIG. **4**A a spatial view of a first embodiment of a device according to the invention for moving a drill pipe in a first position,

[0054] FIG. **4**B a spatial view of the device according to the invention for moving a drill pipe in a second position,

[0055] FIG. **5**A a spatial view similar to FIG. **4**A with the first embodiment of the drill pipe according to the invention,

[0056] FIG. **5**B a spatial view similar to FIG. **4**B with the first embodiment of the drill pipe according to the invention

[0057] FIG. **5**C a top view of FIG. **5**A,

[0058] FIG. **5**D a top view of FIG. **5**B,

[0059] FIG. **6**A a side view of a first transmission element according to the invention of the first embodiment of the device according to the invention with engaging elements in a first position,

[0060] FIG. **6**B a similar view to FIG. **6**A with engaging elements according to the invention in a second position,

[0061] FIG. **7** a schematic representation of a first system according to the invention in spatial view after finishing the drilling process,

[0062] FIG. **8** a schematic representation in spatial view at the start of the pulling in of the conduit, and

[0063] FIG. **9** a cross sectional view of a second embodiment according to the invention of two interconnected drill pipes according to the invention in a second embodiment.

[0064] FIG. **10** a schematic representation of a second embodiment of the system according to the invention in side view,

[0065] FIG. **11** a top view of FIG. **10**,

[0066] FIG. **12** a spatial view of FIG. **10**,

[0067] FIGS. **13** to **19** a schematic representation of an embodiment of a mounting device according to the invention with the individual mounting steps,

[0068] FIG. **20** a spatial schematic representation of a third embodiment of a drill pipe according to the invention,

[0069] FIG. **21** a spatial schematic representation of two connected drill pipes for this,

[0070] FIG. **22** a side view of FIG. **21**, and

[0071] FIG. **23** a spatial schematic representation of a shell element.

[0072] FIGS. **1**A, **1**B show in side view a first embodiment of a drill pipe **10** according to the invention. The drill pipe **10** has at its first end a first connection section **11** and at its opposite second end a second connection section **12**, wherein the first connection section **11** corresponds to the second connection section **12** inasmuch as these may be joined together or inserted into one another. The first connection section **11** and the second connection section **12** are provided such that they form a flange connection in a first embodiment of the invention, wherein the first connection section **11** has a support section **13**, in which boreholes **14** are provided. Behind the support section **13** is provided an indentation **15** in the outer wall **16** of the drill pipe **10**. (See FIG. **2**A to **2**D). Corresponding to the boreholes **14**, recesses **17** are provided in the indentation **15**. Furthermore, boreholes **18** are provided in the support section **13**, being designed such that centering pins **19**, provided on the second connection section **12**, can engage in them.

[0073] The second connection section **12** likewise has a support element **20**, on which either bolts **21** are firmly arranged, or in which boreholes **31** are provided, containing a thread in which loose bolts **21** are screwed into the recesses **17** through the boreholes **14** into the threaded boreholes **31** in the support section **20**.

[0074] The indentation **15** may be closed with a covering **22**. The covering **22** is fastened in the indentation **15** for example by means of screws. The covering serves to prevent any objects from gathering in the indentation **15** or in the recesses **17** while the drill pipe **10** is moving in the borehole.

[0075] Inside the drill pipe **10** are firmly arranged several conduits. These include a delivery line **23** for taking away loosened soil or drill cuttings in connection with drill flushing/drilling/bentonite suspension, a pressing line **24**, with which for example a bentonite suspension is introduced to penetrate as a lubricating agent between drill pipes and borehole wall, a driving line **25**, with which for example driving fluid is transported to the drilling device in order to drive a jet pump optionally present there (not shown), a feed line **26** with which for example a bentonite suspension is transported to the drill head, with which the drill cuttings or the loosened dirt is then transported out from the borehole and the working face in front of the drilling tool is supported, and a channel **27**, in which are provided for example high-pressure lines for the spray system of the cutting tools or power lines for the power supply for the drilling device.

[0076] The conduits are connected by a plug-in sleeve system, wherein the first connection section **11** here has pointed ends **28**, being provided with seals, while the second connection section **12** has sleeves **29**, in which the pointed ends **28** of the conduits **23**-**26** and possibly **27** engage. This is evident for example from FIG. **3**B.

[0077] FIG. **3**A and FIG. **3**B show a first drill pipe **10**, which is connected to a second drill pipe **10'** by a flange connection **30**. The first connection section **11** of the first drill pipe **10** is connected to the second connection section **12** of the drill pipe **10'**. The support section **13** and the support section **20** are in contact with each other. The bolts **21** are screwed in through the boreholes **14** into the threaded boreholes **31**. For this, the bolts **21** are inserted into the recesses **17** and inserted into the boreholes **14** of the support section **13** of the first connection section **11**.

[0078] For the connecting of the first connection section **11** to the second connection section **12**, the drill pipes **10**, **10'** are arranged relative to each other such that the centering pins **19** can be inserted into the corresponding boreholes **18**. In this case, the pointed ends **28** of the conduits **23**-**27** should also correspond with the sleeves **29** of the conduits **23**-**26** and **27**. After this, the drill pipes **10**, **10'** are shoved against each other, so that the pointed ends **28** lock in the sleeve **29**. Then the bolts **21** are introduced into the recesses **17** and shoved into the boreholes **14**. The bolts **21** are then screwed into the threaded boreholes **31** of the support section **20** of the second connection section **12**.

[0079] The loosening of the drill pipe **11'** from the drill pipe **10** is then done by unscrewing the bolts **21** from the threaded boreholes **31** and removing the bolts **21** from the recesses **17**. After this, the drill pipe **10'** may be removed from the drill string, the pointed ends **28** of the conduits **23**-**26** and **27** being separated from the sleeves **29** of the conduits **23**-**26** and **27**.

[0080] FIG. **4**A and FIG. **4**B show a spatial view of a device **40** according to the invention for the moving of at least one drill pipe into a borehole or retracting it from this, especially during the near-surface creation of a borehole in

a ground **100** from a starting point **101** to a target point **102** and/or when introducing a pipeline, underground line or underground cable **105** into the ground **101** from a starting point **101** to a target point **102** or vice versa. This shall be called a press frame **40** in the following. The press frame **40** comprises a base **41**, having a framelike superstructure. On the base **41** are provided rails **42**, on which guide elements **43** are provided, which can travel on the rails **42**. On the guide elements **43** is arranged the transmission element **44**.

[0081] Directly or operatively connected to the base **41** is an abutment **45** arranged on the abutment **45**. In this way, two actuators **46**, designed here as a double-stroke cylinder **47**, are connected. One double-stroke cylinder **47** has two hydraulic cylinders **48**, which are joined together by a plate **49**. The cylinders **48** in the present instance are designed as telescopic cylinders. The plate **49** is likewise connected to a guide element **43**, so that the plate **49** can thereby travel on the rails **42** and is guided. The double-stroke cylinders **47** are designed so that in the fully extended state they can move the transmission element **44** substantially as far as the front end of the base **41** on the opposite side of the abutment **45**.

[0082] On the base **41** are provided end bearings **50**, on which a drill pipe **10** or some other element of the drill string can be set down. The end bearings **50** are vertically oriented when a drill pipe **10** is to be placed thereon. During the movement of the transmission element **44** in relation to the base **41**, the supports **50** are folded down horizontally. (See FIG. **4**B).

[0083] FIG. **5**A to FIG. **5**D show a drill pipe **10**, pointing with its second connection section **12** in the direction of the borehole. A starting seal (not shown) could also be provided here at the end of the base **41** facing toward the borehole. The first connection section **11** or its indentation **15** enters into positive-locking connection with an engaging element **53** of the transmission element **44** in that the engaging element **53** engages with the indentation in order to enable a movement of the drill pipe **10**.

[0084] The transmission element **44** comprises a connection plate **51**, with which the double cylinders **47** engage. The transmission element **44** has an opening **52**, into which the drill pipe **10** is introduced. Furthermore, a positive-locking element is provided, which in the present instance has two engaging elements **53**. The engaging elements **53** are respectively connected to a hydraulic cylinder **54**, which are horizontally oriented. The engaging elements **53** are horizontally movable in relation to the transmission element **44**. The movement here occurs preferably by the hydraulic cylinder **54**. The engaging elements **53** can be moved from an open position (FIG. **6**A) to a closed engagement position (FIG. **6**B). In the engagement position shown here, the engaging elements **53** engage in the indentations **15** of the drill pipe **10** and thereby produce a positive-locking connection between the drill pipe **10** and the press frame **40**. Through the actuators **46**, the transmission element **44** can be moved along the rails **42** toward the borehole or away from it. Thanks to the positive-locking connection of the engaging elements **53** with the indentation **15**, both compressive and tensile forces may be applied, so that the drill pipe **10** can be moved out from the borehole or into it. Alternatively, the engaging elements **53** may also consist of multiple elements, which are moved spatially, or in the case of two engaging elements **53** a vertical movement is also possible as an alternative.

[0085] On the back side of the transmission element **44** there are provided connections **55** for the conduits **23**-**26** and **27**, acting as quick connectors with the conduits **23**-**26** and **27**. In regard to the channel **27** it may be necessary to manually introduce hoses or lines into a new drill pipe being connected before the connection is made and to connect them to the hoses or lines of the previous drill pipe **10'** in the channel **27**. It is also possible to have as few connections as possible by making these lines or hoses longer than one drill pipe **10**.

[0086] FIG. **7** shows a schematic representation of the system according to the invention in a spatial representation. A starting ditch **101** here is provided in the ground **100**, from which a borehole (not shown) is produced to a target ditch **102**. In the starting ditch **101** there is provided a press frame **40**. The distance between a starting ditch **101** and a target ditch **102** can be up to 1500 m or more. In FIG. **7** one can see how a drilling device **103** has arrived in the target ditch **102**. The drilling device **103** is then released from the drill string and removed from the target ditch **102**. On the first drill pipe **10** of the drill string is arranged an adapter **104**, which is connected to a protective pipe **105** being laid or, if that is not needed, directly to the underground line or the underground cable. In the starting ditch in this embodiment the press frame **40** has been turned around so that the abutment **45** is located at the starting point of the borehole (not shown) and is braced here. Alternatively, it is also possible for the press frame **40** to be designed so that the necessary forces are provided both in the extension direction of the hydraulic cylinder **48** and in the retraction direction of the hydraulic cylinder **48** so that the press frame does not have to be rotated.

[0087] When creating the borehole, individual drill pipes **10** or also several already interconnected drill pipes are connected to the drill string and shoved into the ground **100** by the press frame **40**. The removal of the drill pipes **10** is done in that they are pulled out from the borehole by the press frame **40**. Once a drill pipe **10** has been pulled out completely, it is separated and removed from the drill string, for example as described above. Alternatively, several drill pipes connected to form a drill string section may be dismounted. During the pulling out of the drill pipes, the protective pipe **105** or the underground line or the underground cable is introduced at the same time directly into the borehole in the ground **100**.

[0088] Alternatively to the flange connection **30**, a tensile-resistant plug-in sleeve connection **32** for the connecting of two drill pipes **10**, **10'** in a second embodiment is shown in FIG. **9**. The tensile-resistant plug-in sleeve connection **32** has a pointed end **33** and a sleeve **34**. These are shown connected in FIG. **9**. The pointed end **33** has a connection surface **35** and the sleeve **34** has a connection surface **36**. In the connection surface **35** there is provided at least one indentation **37** and in the connection surface **36** there is likewise provided at least one corresponding indentation **38**. If the pointed end **33** is shoved into the sleeve **34**, the connection surfaces **35**, **36** come into contact and the indentations **37**, **38** form a groove **39**. A shearing element **60** is inserted into the groove **39** to make the tensile-resistant connection. Alternatively, several grooves **39** and shearing elements **60** could be provided. In addition, it is possible if required to provide at least one seal **61** between the connection surfaces **35**, **36**. Firmly arranged conduits/channels

23-27 may likewise be provided accordingly inside the drill pipes **10**, **10'** with tensile-resistant plug-in sleeve connection **32**.

[0089] Depending on which connection section **11**, **12** is supposed to be connected to the transmission element **44**, one alternative embodiment proposes in regard to the press frame **40** that either a pointed end **33** or a sleeve **34** is provided as the transmission element **44** or its engaging element **53** to make a tensile-resistant plug-in sleeve connection **32**.

[0090] FIGS. **10** to **12** show a schematic representation of another embodiment of the system according to the invention in a side view. A starting ditch **101'** has been provided in the ground **100'**, from which a borehole **102'** is produced in the microtunneling method from a starting point to a target point (not shown). In the starting ditch is provided a scaffolding **104'**, optionally acting as an expansion of the starting ditch **101'** and in which the components of the system according to the invention are provided.

[0091] In the starting ditch **101'** there is arranged an advancing unit **103'**, such as a pipe thruster or a press frame **40**, with which a drill string **110** is pressed or shoved into the borehole **102'**. At the front end **105'** of the drill string **110** there is provided a drilling device **106**, with which the borehole **102'** is created. The drilling device **106** is supplied via supply lines **108** with power and drill suspension for carrying away the loosened drill cuttings. The supply lines **108** are provided outside the starting ditch **101'**, for example on a drum (not shown), and are unwound from the drum, bundled together (position **109**) and introduced into the borehole as the borehole makes progress.

[0092] The drill string here consists of drill pipes **10"** in a third embodiment, which are represented in FIGS. **20** to **23**.

[0093] The drill pipe **10"** shown here as an example consists of 2 shell elements **11'**, **12'**, which are preferably identical in design here. It is of course possible to use more than two shell elements **11'**, **12'**, if this should prove to be advantageous.

[0094] At its front end **13'** and at its rear end **14'** the drill pipe **10"** has a connection flange **15'**. For this, indentations **17'** are made in a wall **16'** of the shell element **11'**, **12'**. Corresponding to the indentations **17'**, boreholes **18'** are provided, into which connection bolts **20'** may be inserted. These are screwed together with nuts **19'**. In this way, a non-positive locking connection is produced between the individual drill pipes **10"**. In an indentation **21'** provided in the flange **15'** in the area of the boreholes **18'** a seal (not shown) may be introduced. Alternatively, the connection of the drill pipes **10"** may be positive-locking via engaging elements (not shown). An integral bonded connection is also possible, however then an easy releasing of the drill pipes from each other after the removal is not easily possible.

[0095] Furthermore, an indentation **22'** is provided in the wall **16'**, acting as a point of application of the forces for advancing or pulling back the drill string **110** via the advancing unit **103'**.

[0096] Furthermore, indentations **23'** are provided in the wall **16'**, being bounded on one side by a web **24**. Boreholes **25"** are provided in the indentations **23'** and the web **24'**. This likewise involves a flange-like connection possibility for the shell elements **11'**, **12'**, which are arranged one on the other. Bolts **26'** can likewise be installed here, and are screwed together with nuts **27'**. In this way, an axial connecting of the shell elements **11'**, **12'** occurs along a connection line **28'**. Furthermore, an indentation **29'** is provided in the web **24'**, in which likewise a seal (not shown) may be inserted.

[0097] In order to make possible a better positioning of the drill pipes **10"** relative to each other and that of the shell elements **11'**, **12'** relative to each other, boreholes **30'** and positioning pins **31'** are arranged at or on the web **24'** or the front or rear end **13'**, **14'** of the drill pipe **10"**, which engage with each other when correctly positioned.

[0098] In order to accomplish a better stability of the drill string **110**, the drill pipes **10"** are respectively arranged for example with a 90 degree offset from each other, as is shown in FIG. **21**, **22**.

[0099] The assembling of the drill pipes **10"** and the following connection of the drill pipes **10"** to each other to form the drill string **110** takes place in a mounting device **400**. This comprises, as shown in FIGS. **13** to **19**, a stand **410** in which a feed area **430** and a mounting area **420** are provided. The supply lines **108** run through the mounting area **420**.

[0100] The feed area **430** comprises an outer area **440** and an inner area **450**. In the outer area **440**, as is shown here as an example, a drill pipe **10"** which is composed of two shell elements **11'**, **12'** assembled but not yet locked in place is arranged on a carriage **460**, which can travel on guide elements **470** from the outer area **440** to the inner area. This position is represented in FIG. **13**.

[0101] The mounting device **400** here comprises for example two manipulating elements **500**, **510**. The upper manipulating element **500** and the lower manipulating element **510** are each arranged on the frame **410** and able to travel vertically. The upper manipulating element **500** has gripping elements **520**, which grasp the upper shell element **12**. The lower manipulating element **510** comprises a support **530**, on which the lower shell element **11'** is placed.

[0102] In FIG. **14**, the upper manipulating element **500** has been lowered onto the upper shell element **12'** and the grippers **520** are in engagement. At the same time, the lower manipulating element **510** has been raised so that the drill pipe **10"** emerges from the carriage **460**, so that the latter can travel back to the outer area **440**. Next, the upper manipulating element **500** together with the upper shell element **12'** are raised and the lower manipulating element **510** is lowered (FIG. **15**). After this, the two manipulating elements **500**, **510** travel from the feed area **430** to the mounting area **420** and are moved so that the shell elements **11'**, **12'** are again sitting on one another. (FIG. **16**). The shell elements **11'**, **12'** of the drill pipe **10"** are locked in place and then joined together. The drill pipe **10"** is then rotated if necessary, moved toward the borehole **102'** against the drill string **110** and connected to the latter. All components of the device **400** then release the drill pipe **10"**, and the drill string **110** is pressed by the advancing unit **103'** into the borehole **102'**.

List of reference symbols

10, 10', 10" Drill pipe
11 First connection section
11' Shell element
12 Second connection section
12' Shell element
13 Support section
13' Front end
14 Borehole
14' Rear end
15 Indentation

-continued

List of reference symbols
15' Connection flange
16 Outer wall
16' Wall
17 Recess
17' Indentation
18, 18' Borehole
19 Centering pin
19' Nut
20 Support section
20' Connection bolt
21 Bolt
21' Indentation
22 Covering
22' Indentation
23 Delivery line
23' Indentation
24 Pressing line
24' Web
25 Driving line
25' Borehole
26 Feed line
26' Bolt
27 Channel
27' Nut
28 Pointed end
28' Connection line
29 Sleeve
29' Indentation
30 Flange connection
30' Borehole
31 Threaded borehole
31' Positioning pins
32 Tensile-resistant plug-in sleeve connection
33 Pointed end
34 Sleeve
35 Connection surface
36 Connection surface
37 Indentation
38 Indentation
39 Groove
40 Device/press frame
41 Base
42 Rail
43 Guide element
44 Transmission element
45 Abutment
46 Actuator
47 Double-stroke cylinder
48 Cylinder
49 Plate
50 End bearing
51 Connection plate
52 Opening
53 Engaging element
54 Hydraulic cylinder
55 Connection
60 Shearing element
100, 100' Ground
101, 101' Starting ditch
102 Target ditch
102' Boring/borehole
103 Drilling device
103' Advancing unit
104 Adapter
104' Scaffolding
105 Protective pipe/underground cable/underground line
105' Front end
106 Drilling device
108 Supply lines
109 Position
110 Drill string

-continued

List of reference symbols
400 Mounting device
410 Stand/frame
420 Mounting area
430 Feed area
440 Outer area
450 Inner area
460 Carriage
470 Guide element
500 Upper manipulating element
510 Lower manipulating element
520 Gripping element
530 Support

1-27. (canceled)

28. A drill pipe for use during the creation of a borehole in a ground from a starting point to a target point along a predetermined drill line for the near-surface laying of at least one of underground cables or underground lines in the ground, wherein the borehole is gradually created by means of a drilling device comprising a drilling tool for loosening the ground when the drill pipes are advanced, comprising;

at least one connection section at each end for detachably connecting the drill pipe to a further element of a drill string in a tensile-resistant manner;

at least one element for producing a tensile-resistant connection to a corresponding element of an advancing device for at least one of advancing the drill pipe into or retracting it from the borehole; and,

an outer wall comprising one piece.

29. The drill pipe as claimed in claim **1**, wherein the connection by the respective connection sections of the drill pipe to another element of the drill string comprises at least one of a positive-locking or a non-positive-locking connection.

30. The drill pipe as claimed in claim **1**, wherein the drill pipe has at its first end a first connection section and at its opposite second end a second connection section compatible with connection section mate-able with the first connection section.

31. The drill pipe as claimed in claim **30**, wherein the first connection section and the second connection section in the mounted state form a flange connection, comprising at least one of connection elements or boreholes for a bolt connection.

32. The drill pipe as claimed in claim **30**, wherein the first connection section and the second corresponding connection section form a tensile-resistant plug-in sleeve connection, wherein one connection section has a pointed end and the other connection section is a mating sleeve, each of them comprising at least one corresponding indentation in the opposite surface, which forms a groove in the assembled state in which at least one shearing element is inserted to produce the tensile-resistant supporting connection.

33. The drill pipe as claimed in claim **1**, wherein the element for producing a tensile-resistant connection with the corresponding element of the advancing device is an indentation in the outer wall of the drill pipe.

34. The drill pipe as claimed in claim **33**, wherein the indentation includes a covering.

35. The drill pipe as claimed in claim **1**, wherein the element for producing a tensile-resistant connection with the

corresponding element of the advancing device is an element of a tensile-resistant plug-in sleeve connection.

36. The drill pipe as claimed in claim **1**, wherein the drill pipe comprises at least one conduit section arranged in at least one of the outer wall or in the inner space of the drill pipe at the outer wall and extending in parallel along the outer wall, wherein the at least one conduit section has at each of its ends a connection element for producing a connection between conduit sections of at least one of interconnected drill pipes or elements of the drill string.

37. A device for moving at least one drill pipe, at least one of into a borehole or out from it, at least one of during the near-surface creation of a borehole in a ground from a starting point to a target point or when placing at least one of a pipeline, underground line or underground cable in the ground from a starting point to a target point or vice versa, comprising;

at least one base, with at least one abutment,

at least one actuator for moving the at least one drill pipe operatively connected to the base, comprising a transmission element operatively connected to the actuator, for transmitting the movement produced by the at least one actuator to the at least one drill pipe; and,

a guide element which is movable relative to the base and operatively connected to the transmission element, wherein the transmission element comprises at least one positive-locking element for the transmission of the motion, and a tensile-resistant releasable connection is disposed between transmission element and drill pipe.

38. The device as claimed in claim **37**, wherein the at least one actuator is at least one of a hydraulic cylinder or a rack and pinion drive.

39. The device as claimed in claim **37**, wherein the positive-locking element comprises at least one engaging element which provides the tensile-resistant releasable connection by engaging with an engaging section of the drill pipe.

40. The device as claimed in claim **39**, wherein the at least one engaging element encloses the drill pipe, wherein the positive-locking element comprises at least two engaging elements, configured to be at least one of horizontally or vertically movable in the positive-locking element.

41. The device as claimed in claim **39**, wherein the at least one engaging element is a connection section corresponding to a connection section of the drill pipe.

42. The device as claimed in claim **41**, wherein the connection sections form a tensile-resistant plug-in sleeve connection, wherein the engaging element has at least one of a pointed end or a sleeve corresponding to the pointed end, having at least one corresponding indentation in the opposite surfaces, which form a groove in the assembled state in which at least one shearing element can be inserted to produce the tensile-resistant supporting connection.

43. The device as claimed in claim **37**, wherein a starting seal is provided in connection with the base.

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