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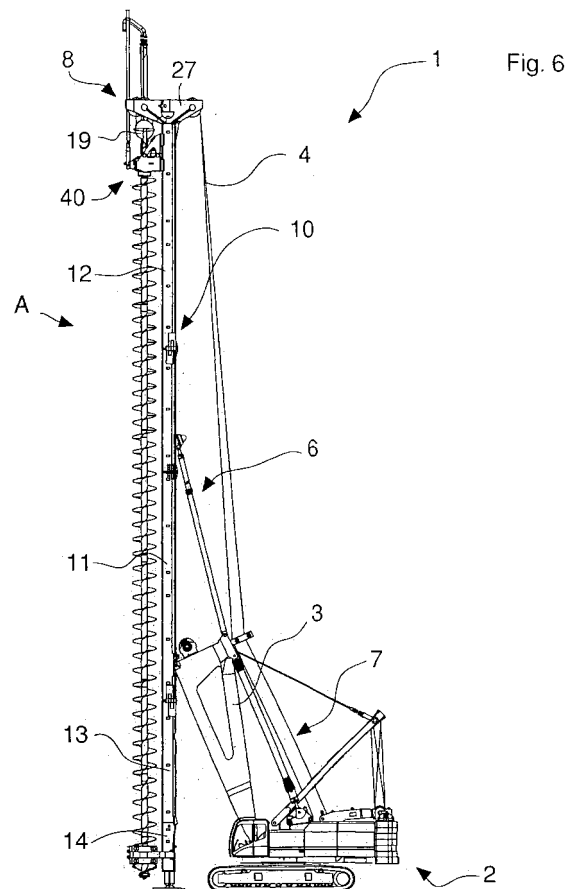
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(54) **Machine for drilling**

(57) A machine for drilling comprises undercarriage means (2), which rotatably support jib means (3), to which there can be removably associated, in an assembled condition (A) of said machine (1), supporting and guide mast means (10) for excavating devices (40), said mast means (10) comprising a plurality of elongated elements (11, 12, 13) which can be interconnected and are mobile in such a way as to enable arrangement of said mast means (10) selectively in an extended position (E) and in a folded position (F).



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Description

[0001] The present invention relates to a machine for drilling and boring, in particular a crawler crane provided with a jib configured for supporting a guide mast for excavation equipment.

[0002] In the sector of machines for drillings, there is known the use of a crawler crane as basic machine, in which the lattice jib carries a supporting and guide mast for various devices for carrying out operations of drilling, boring, pile-driving, etc. (Figure 1).

[0003] Said machines, which are generally used for making holes of a diameter of up to 1500 mm and a depth of up to approximately 30 m in a single operation, generally have large dimensions and must be dismantled to be transported on the road by appropriate road trucks.

[0004] Typically the jib, the ballast, and the crawler tracks of the crane are dismantled from the basic machine and transported separately from the latter.

[0005] Likewise, the guide mast is dismantled into a plurality of elements and is also transported separately on a respective truck.

[0006] Finally, not less than three lorries or articulated vehicles of large dimensions are necessary for transporting one of said machines in a dismantled condition.

[0007] The main problem of known machines of the type described above lies in the long times required for their assembly and disassembly, which, in the case of machines having larger dimensions and weights, can require even a number of days.

[0008] As regards the times for installation of the tracks, the ballast, and possibly the jib of the crane, various optimization solutions already exist, which enable significant simplification and acceleration of the various operating steps for assembly.

[0009] The steps for assembly of the guide mast are instead particularly long and laborious.

[0010] In a first step, the various elements of the mast must be arranged properly aligned on a series of resting trestles to be connected together and fixed by means of screws and/or bolts. Alignment is particularly complex and problematical in the case where the trestles are to be positioned on rough or irregular terrain.

[0011] In a second step, it is necessary to proceed to equipping the crane with the ropes, which, being initially wound around the winches of the crane, must be unwound and made to pass through a series of sheaves provided on a top end guide of the mast and in various blocks so that lengths of rope are run over the sheaves a number of times.

[0012] Both of the steps imply a plurality of operations, which must be carried out in part manually by operators and are physically demanding, tiring, and dangerous for the physical safety of the operators.

[0013] One purpose of the present invention is to improve the machines for drilling and boring described above, in particular increasing the versatility and flexibility of use thereof.

[0014] Another purpose is to obtain a machine for drilling that is convenient and fast to set up and equip so as to reduce significantly the times required for its assembly/disassembly, with consequent reduction in the management costs.

[0015] A further purpose is to obtain a machine, assembly and disassembly of which will require a reduced number of manual operations, that will not be too physically demanding for the operators and will involve a low degree of danger for them.

[0016] Yet another purpose is to provide a machine that, once dismantled, will present compact dimensions and limited encumbrance so as to enable convenient transportation on the road.

[0017] Yet a further purpose is to obtain a machine that has a compact and sturdy structure, will be safe and reliable in operation, and will enable the guide mast to be placed in a vertical and/or inclined operating position in a precise and accurate way.

[0018] Provided according to a first aspect of the invention is a machine for drilling comprising undercarriage means, which rotatably support jib means, to which there can be removably associated, in an assembled condition of said machine, supporting and guide mast means for excavating devices, said machine being characterized in that said mast means comprise a plurality of elongated elements, which can be interconnected and are mobile in such a way as to enable arrangement of said mast means selectively in an extended position and in a folded position.

[0019] Thanks to this aspect of the invention, it is hence possible to obtain a machine for drilling and boring that will be easy and fast to set up and equip so as to reduce significantly the times necessary for its assembly/disassembly, with consequent reduction in the management costs.

[0020] Since the mast means comprise elements that are interconnected, for example hinged, to one another, they can be folded and extended rapidly and conveniently without the need to carry out delicate and laborious procedures of positioning and alignment. The procedures of assembly and disassembly are further simplified and speeded up by the presence of movement means, which, being positioned within the elements themselves, displace the aforesaid elements between the two different positions in an automatic way, without any need for manual intervention on the part of operators. In this way, it is possible to reduce the number of manual operations normally necessary for assembly/disassembly of the mast, which entail for the operators considerable physical effort and constitute a working hazard.

[0021] Thanks to the compact shape of the jib means, which have a box-section structure, the machine according to the invention in the dismantled condition moreover has dimensions and encumbrance that are particularly compact and limited so as to enable convenient transportation on the road.

[0022] Provided according to a second aspect of the

invention is a machine for drilling comprising undercarriage means, which rotatably support jib means, to which there can be removably associated, in an assembled condition of said machine, and supporting and guide mast means for excavating devices, said machine being characterized in that it comprises top end-guide means designed to support and guide rope means for hoisting said excavation devices, said end-guide means being connected in a removable way to said mast means.

[0023] Thanks to this aspect of the invention, it is possible to provide a machine for drilling and boring that is particularly convenient to transport in the dismantled condition. Since the end-guide means are removably connected to the mast means, they can in fact be easily and rapidly dismantled from the latter and possibly fixed to engagement means, provided on the jib means. In this way, even dismantling and separating the mast means during transportation of the machine, it is not necessary to disengage from pulley means the end-guide means and from block means the rope means, which can thus remain entrained over the sheaves a number of times. This fact leads to a considerable saving in time both in the assembly step and in the step of disassembly of the machine and makes it possible to avoid a plurality of manual operations that are particularly tiring and hazardous for operators.

[0024] The invention will be better understood and implemented with reference to the attached plates of drawings, which illustrate a non-limiting example of embodiment and in which:

- Figure 1 is a side view of a known machine for drilling of the crawler-crane type with mast;
- Figure 2 is a side view of the machine for drilling according to the invention in an assembled condition, which highlights mast means in a raised position;
- Figure 3 is a perspective view of the machine of Figure 1 in a dismantled condition;
- Figure 4 is a perspective view of the machine of Figure 1 in a partially assembled condition;
- Figure 5 is a side view of the machine of Figure 1 in an assembled condition, which highlights the mast means in a lowered position; and
- Figure 6 is a side view of the machine of Figure 1 in the assembled condition and in association with a drilling device and with resting means associated to said mast means.

[0025] With reference to Figures 2 and 6, a machine for drilling 1 according to the invention is illustrated, which comprises an undercarriage 2, rotatably mounted on which is a jib 3 designed to support a guide and supporting mast 10 for drilling and boring devices 40 of a known type.

[0026] The mast 10, which is removably fixed to the jib 3, in turn supports end-guide means 8 designed to receive and guide hoisting ropes 4 for the drilling and boring devices 40.

[0027] The undercarriage 2 is provided with dismantlable crawler tracks 25 and houses actuation means 20 designed to move the jib 3, and winch means 28 arranged for operating the hoisting ropes 4.

5 **[0028]** Removably fixed to a portion of the undercarriage 2 opposite to the one to which the jib 3 is connected is a ballast 30.

[0029] The jib 3 comprises a box-section structure that is substantially made up of three box-type beams or longitudinal members joined together to form a triangle. The jib 3 consequently presents a first end 3a hinged to the undercarriage 2, a second end 3b connected to actuation means 20, and a third end 3c, which can be rotatably coupled to said mast 10.

10 **[0030]** The overall dimensions of the jib 3 are such as to enable transportation thereof on the road without any need to take it down from the undercarriage 2.

[0031] The box-section structure of the jib 3, in addition to enabling reduction in the overall dimensions, offers, as compared to lattice jibs of a known type, a higher strength in regard to torsional stresses that are generated during operation of the drilling and boring devices. -

[0032] The means 20 for actuation of the jib 3 comprise respective motor means 21, designed to move by means of further ropes 22 rod means 23, hinged at a first end 23a to the undercarriage 2 and connected at the remaining second end 23b to the second end 3b of the jib 3 by tie-rod means 24.

20 **[0033]** As is better illustrated in Figures 3 and 4, the machine 1 further comprises first strut means 6 and second strut means 7, designed to connect said jib 3 to the mast 10 and to the undercarriage 2, respectively.

[0034] The first strut means 6 comprise a pair of first struts 6a, 6b that can be telescopically lengthened and are rotatably connected to first means 15 for attachment of the mast 10 and to respective joining plates 14a, 14b, fixed to opposite sides of the second end 3b of the jib 3.

30 **[0035]** Likewise, the second strut means 7 comprise a pair of second struts 7a, 7b, which can also be telescopically lengthened and are fixed, at one respective end, to means 26 for connection of the undercarriage 2, and at the remaining end, to said joining plates 14a, 14b.

[0036] Each strut 6a, 6b, 7a, 7b includes a linear oleodynamic actuator, which is able to lengthen/shorten the strut itself by a limited amount in order to correct and adjust the position of the mast 10 in an assembled condition of the machine 1, as will be described in greater detail in the description of operation of the latter.

[0037] The use of telescopic struts 6a, 6b, 7a, 7b in association with the box-section jib 3, in addition to enabling an extremely sturdy and compact structure, makes it possible to perform, as compared to traditional machines, a larger variety of movements for setting the mast 10 in a vertical or inclined operating position for compensating for any possible irregularities of the terrain on which the machine moves.

[0038] The mast 10 comprises a plurality of elongated elements, for example a first, central, element 11, a sec-

ond, top, element 12, and a third, bottom, element 13, which are hinged to one another at the ends in such a way as to enable the mast 10 to be folded or extended in a folded position F and an extended position E.

[0039] In particular, the second element 12 and the third element 13 are rotatably mounted on opposite ends of the first element 11 about respective parallel axes X1, X2 in such a way as to rotate through approximately 180°, in the same plane as a longitudinal reference plane of the mast 10.

[0040] The length of the first element 11 is slightly greater than the lengths of the second element 12 and the third element 13 to enable folding through 180° of the latter elements on one and the same side of the first element 11.

[0041] In the extended position E of the mast 10, the aligned elements 11, 12, 13 are clamped with respect to one another by means of threaded connections, for example bolts or screws.

[0042] The elongated elements 11, 12, 13 are, for example, rectilinear hollow beams with rectangular or square cross section.

[0043] The mast 10 comprises movement means 17, positioned inside the elements 11, 12, 13 and arranged for rotating the second element 12 and the third element 13 from the folded position F to the extended position E, and vice versa.

[0044] The movement means 17 comprise oleodynamic means and lever mechanisms, of a known type and not illustrated in detail in the figures.

[0045] In a version (not illustrated) of the machine 1, it is envisaged that the second element 12 and the third element 13 can be slidably connected to the first element 11 by means of purposely provided guide and supporting means, in such a way as to change from the folded position F to the extended position E and vice versa, not via rotation but via two distinct and successive mutually orthogonal movements of translation. In particular, in said configuration, the second element 12 and the third element 13 can slide axially in sequence in a first direction and in a second direction parallel and orthogonal, respectively, to a longitudinal axis of the first element 11.

[0046] Fixed to the first central element 11, in addition to the first attachment means 15, are second attachment means 16 for removable coupling to the third end 3c of the jib 3.

[0047] Removably fixed to a free end 12a of the second element 12 are the end-guide means 8 comprising sheave means 18, around which the lengths of rope 4 are wound a number of times for raising the block means 19.

[0048] The end-guide means 8 comprise an approximately T-shaped body 27, mounted transversely on a free end of the second element 12 of the mast 10 and the opposed arms of which support a plurality of sheaves 18 mounted idle.

[0049] Removably fixed to a respective free end 13a of the third element 13 is a resting element 14, referred

to as mast foot, by means of which the mast 10 in the assembled and upright configuration A of the machine 1 rests on the ground (Figure 6).

[0050] With reference to Figure 3, the machine for drilling 1 is illustrated in a dismantled configuration B in which the mast 10 is disconnected from the jib 3 and set in the folded position F, whilst the undercarriage 2 is without the tracks 25 and has the jib 3 bent forwards and in an extended position. The end-guide means 8 are engaged to the jib 3.

[0051] In said configuration, the mast 10 and the undercarriage 2 can be conveniently loaded and transported by respective road trucks.

[0052] The jib 3 comprises appropriate engagement means designed to support the end-guide means 8, with the corresponding block means 19, once these are disconnected from the mast 10. The engagement means are provided on a side wall of the jib 3, in a position corresponding to the joining plate 14a.

[0053] It may be noted how said solution enables the ropes 4 to be kept engaged and wound on the sheave means 12 and on the block means 19 with considerable saving of time in the step of assembly/disassembly of the machine. It is in fact no longer necessary to take down the ropes 4 from said sheave means 18 and block means 19 and subsequently put them back on.

[0054] In the dismantled configuration B, it is moreover envisaged that the first strut means 6 will remain associated to the mast 10 and disconnected from the jib 3, the second strut means 7 remaining connected to the jib 3 and to the undercarriage 2.

[0055] The sequence of assembly of the machine 1 is now described with particular reference to Figures 3 to 6.

[0056] Starting from the dismantled configuration B, it is initially envisaged to complete the undercarriage 2, installing the tracks 25 and possibly the ballast 30.

[0057] Separately, the mast 10 is laid on a pair of trestles or supports, set at a distance such as to be able to support the first element 11 of the mast.

[0058] To unload the mast from the respective road truck and position it on the trestles, it is possible to use the jib 3 already operating on the undercarriage 2 or else a service crane, for example, a crane mounted on a lorry.

[0059] The undercarriage 2 is hence positioned with respect to the mast 10 in such a way that the jib 3 can be connected to the second attachment means 16 of the first element 12 and the first two struts 6a, 6b can be raised and connected to the joining plates 14a, 14b of the jib 3 (Figure 4).

[0060] At this point, the mast can be pulled out into the extended position E in an automatic way by actuating the movement means 17 inside the elements 11, 12, and 13. The movement means 17 are connected, for example, to an external supply circuit provided with an oleodynamic pump.

[0061] Once the elements 11, 12, 13 have been extended and aligned, they are clamped to one another by means of screws and/or bolts.

[0062] Alternatively, the mast 10 can be opened into the extended position E before being fixed to the jib 3 to enable use of the latter to carry out some subsequent assembly steps, for example, the subsequent connection of the end-guide means 8 to the mast 10.

[0063] The end-guide means 8 are disengaged from the means for engagement of the jib 3 and laid on the ground and are then raised and fixed to the free end 12a of the second element 12 (Figure 5). To do this, it is necessary to unwind the ropes 4 partially from the winch means 28.

[0064] Once the end-guide means 8 are fixed, the machine 1 is assembled, and it is possible to raise the mast 10 into the vertical operative position, by actuating the actuation means 20 that act on the jib 3.

[0065] During raising, the second struts 7a, 7b are free to be shortened telescopically. At the end of the raising operation, the telescopic parts of the second struts 7a, 7b are fixed to one another, and only minor corrections in length of the struts are allowed by means of the oleodynamic actuators associated thereto in order to adjust the position of the mast 10 precisely.

[0066] Said solution guarantees the safety and stability of the machine, given that any accidental movements or failure of the oleodynamic actuators cannot lead to excessive movements of the mast 10, which could cause toppling of the machine 1.

[0067] Once the mast has been set in the vertical operative position (Figure 2), there is assembled to the third element 13 of the mast 10 the resting element 14, by means of which the mast 10 in the assembled and upright configuration A of the machine 1 rests on the ground.

[0068] At this point, the machine 1 is ready for receiving a drilling device 40 fixed and supported by the block means 19 and constrained to the resting element 14 (Figure 6).

[0069] For movement and installation of the end-guide means 8 of the first struts 6a, 6b, of the resting element 14 and of the various assembly equipment, it is convenient to use a small service crane, or the crane of a lorry, possibly with the aid of an auxiliary rope of the crane, once the mast 10 is in the vertical position.

[0070] The procedure of disassembly basically comprises the same steps as those of the assembly procedure in reverse order.

[0071] It may be noted how the machine for drilling 1 according to the invention is relatively easy and fast to assemble and dismantle, enabling a considerable reduction in the times involved with consequent reduction in the management costs.

Claims

1. A machine for drilling comprises undercarriage means (2), which rotatably support jib means (3), to which there can be removably associated, in an assembled condition (A) of said machine (1), support-

ing and guide mast means (10) for excavating devices (40), said machine being **characterized in that** said mast means (10) comprise a plurality of elongated elements (11, 12, 13), which can be interconnected and are mobile in such a way as to enable arrangement of said mast means (10) selectively in an extended position (E) and in a folded position (F).

2. The machine according to Claim 1, in which elongated elements (11, 12, 13) are rotatably connected to one another.

3. The machine according to Claim 2, in which said mast means (10) comprise a first element (11), the opposite ends of which are hinged respectively to a second element (12) and to a third element (13).

4. The machine according to Claim 3, in which said second element (12) and said third element (13) are mounted so that they can turn about respective axes (X1, X2) parallel to one another.

5. The machine according to any one of the preceding claims, further comprising movement means (17) for moving said elongated elements (11, 12, 13) between said folded position (F) and said extended position (E) of said mast means.

6. The machine according to Claim 5, in which said movement means (17) are set within said elongated elements (11, 12, 13).

7. The machine according to Claim 5 or Claim 6, in which said movement means (17) comprise oleodynamic cylinders and lever mechanisms.

8. The machine according to any one of Claims 5 to 7, when Claim 5 depends upon Claim 3 or Claim 4, in which said movement means (17) are arranged for rotating said second element (12) and said third element (13) with respect to said first element (11).

9. The machine according to any one of the preceding claims, comprising resting means (14) removably connected to said mast means (10) in said extended position (E) for constraining said mast means (10) to the ground.

10. The machine according to any one of the preceding claims, comprising end-guide means (8) designed to support and guide rope means (4) for hoisting block means (19).

11. The machine according to Claim 10, in which said end-guide means (8) can be fixed in a removable way to said mast means (10) set in the extended position (E).

12. The machine according to Claim 11, when Claim 9 depends upon Claim 3 or Claim 4, in which said end-guide means (8) are connected to a free end of said second element (12).
13. The machine according to any one of Claims 10 to 12, in which said end-guide means (8) comprise pulley means (18) for guiding and supporting said rope means (4).
14. The machine according to Claim 13, in which said end-guide means (8) comprise an approximately T-shaped body (27) provided with opposed arms, which support said pulley means (18).
15. The machine according to any one of Claims 10 to 14, in which said jib means (3) comprise engagement means designed to support said end-guide means (8) and said block means (19) in a dismantled condition (B) of said machine (1).
16. The machine according to any one of the preceding claims, comprising first strut means (6), which are designed to connect removably said first mast means (10) to said jib means (3).
17. The machine according to Claim 16, in which said first strut means (6) comprise at least one first strut (6a, 6b), which connects first attachment means (15) of said mast means (10) to joining means (14a, 14b) of said jib means (3).
18. The machine according to any one of the preceding claims, comprising second strut means (6), which are designed to connect said jib means (3) to said undercarriage means (2).
19. The machine according to Claim 18, when depending upon Claim 17, in which said second strut means (7) comprise at least one second strut (7a, 7b), which connects said joining means (14a, 14b) to connection means (26) of said undercarriage means (2).
20. The machine according to Claims 17 and 19, in which said first strut (6a, 6b) and said second strut (7a, 7b) can be lengthened and shortened.
21. The machine according to Claim 17 and 19 or else Claim 20, in which said first strut (6a, 6b) and said second strut (7a, 7b) comprise respective linear actuator means.
22. The machine according to Claim 21, in which said linear actuator means include an oleodynamic cylinder.
23. The machine according to any one of the preceding claims, in which said jib means (3) comprise a box-

section element.

24. The machine according to Claim 23, when depending upon any one of Claims 18 to 22, when Claim 18 depends upon Claim 16 or Claim 17, in which said box-section element (3) has a practically triangular shape and has a first end (3a), which is rotatably coupled to said undercarriage means (2), a second end (3b), connected to said first strut means (6) and to said second strut means (7), and a third end (3c), which is removably connected to said mast means (10).
25. The machine according to any one of the preceding claims, comprising actuation means (20) associated to said undercarriage means (2) and arranged for moving said jib means (3).
26. The machine according to Claim 25, in which said actuation means (20) comprise motor means (21) designed to move, by further rope means (22) rod means (23), which are rotatably coupled to said undercarriage means (2) and are connected to said jib means (3) by tierod means (24).
27. The machine according to Claim 10 to 13, comprising winch means (28) associated to said undercarriage means (2) and arranged for actuating said rope means (4).
28. A machine for drilling comprising undercarriage means (2), which rotatably support jib means (3), to which there can be removably associated, in an assembled condition (A) of said machine, supporting and guide mast means (10) for excavating devices (40), said machine being **characterized in that** it comprises end-guide means (8) designed to support and guide rope means (4) for hoisting said excavating devices (40), said end-guide means (8) being removably coupled to said mast means (10).
29. The machine according to Claim 28, in which said end-guide means (8) comprise pulley means (18) for supporting and guiding said rope means (4) engaged to said block means (19).
30. The machine according to Claims 29, in which said end-guide means (8) comprise an approximately T-shaped body (27) provided with opposed arms, which support said pulley means (18).
31. The machine according to Claim 29 or Claim 30, in which said jib means (3) comprise engagement means designed to support said end-guide means (8) and said block means (19) in a dismantled condition (B) of said machine (1).
32. The machine according to Claims 28 to 31, in which

- said mast means (10) comprise a plurality of elongated elements (11, 12, 13) which can be interconnected and are mobile in such a way as to enable arrangement of said mast means (10) selectively in an extended position (E) and in a folded position (F).
33. The machine according to Claim 32, in which said elongated elements (11, 12, 13) are rotatably connected to one another.
34. The machine according to Claim 33, in which said mast means (10) comprise a first element (11), the opposite ends of which are hinged respectively to a second element (12) and to a third element (13).
35. The machine according to Claim 34, in which said second element (12) and said third element (13) are mounted so that they can turn about respective axes (X1, X2) parallel to one another.
36. The machine according to Claim 34 or Claim 35, in which said end-guide means (8) are connected to a free end of said second element (12).
37. The machine according to any one of Claims 32 to 36, further comprising movement means (17) for moving said elongated elements (11, 12, 13) between said folded position (F) and said extended position (E) of said mast means (10).
38. The machine according to Claim 37, in which said movement means (17) are set within said elongated elements (11, 12, 13).
39. The machine according to Claim 37 or Claim 38, in which said movement means (17) comprise oleodynamic cylinders and lever mechanisms.
40. The machine according to any one of Claims 37 to 39, when Claim 37 depends upon any one of Claims 34 to 36, in which said movement means (17) are arranged for rotating said second element (12) and said third element (13) with respect to said first element (11).
41. The machine according to any one of Claims 32 to 40, comprising resting means (14) removably connected to said mast means (10) in said extended position (E) for constraining said mast means (10) to the ground.
42. The machine according to any one of Claims 28 to 41, comprising first strut means (6), which are designed to connect removably said first mast means (10) to said jib means (3).
43. The machine according to Claim 42, in which said first strut means (6) comprise at least one first strut (6a, 6b), which interconnects first attachment means (15) of said mast means (10) to joining means (14a, 14b) of said undercarriage means (2).
44. The machine according to Claim 28 to 43, comprising second strut means (6), which are designed to connect said jib means (3) to said undercarriage means (2).
45. The machine according to Claim 44, when depending upon Claim 43, in which said second strut means (7) comprise at least one second strut (7a, 7b), which interconnects said joining means (14a, 14b) to connection means (26) of said undercarriage means (2).
46. The machine according to Claims 43 and 45, in which said first strut (6a, 6b) and said second strut (7a, 7b) can be lengthened and shortened.
47. The machine according to Claim 43 and 45 or else Claim 46, in which said first strut (6a, 6b) and said second strut (7a, 7b) comprise respective linear actuator means.
48. The machine according to Claim 47, in which said linear actuator means include an oleodynamic cylinder.
49. The machine according to any one of Claims 28 to 48, in which said jib means (3) comprise a box-section element.
50. The machine according to Claims 28 to 49, comprising actuation means (20), which are associated to said undercarriage means (2) and are arranged for moving said jib means (3).

Fig. 1

Prior Art

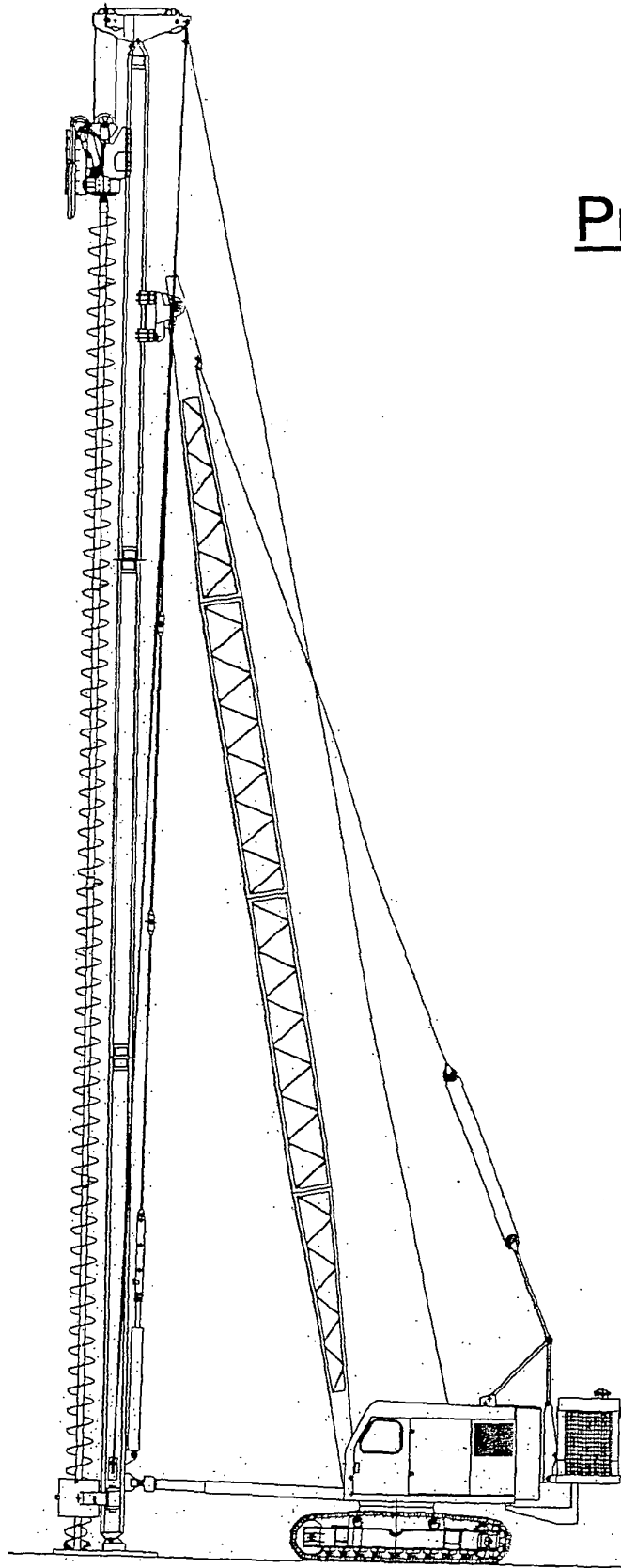
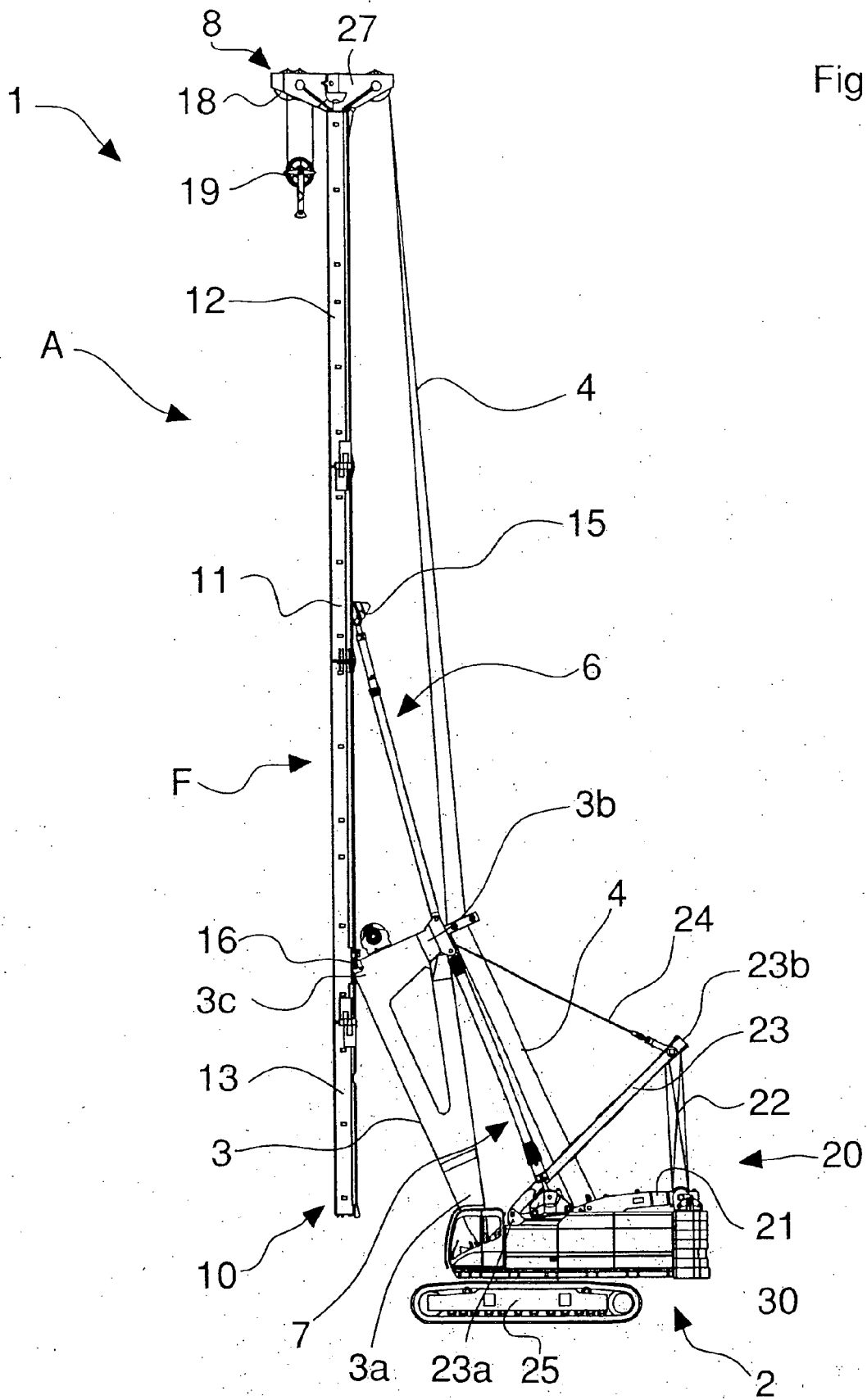
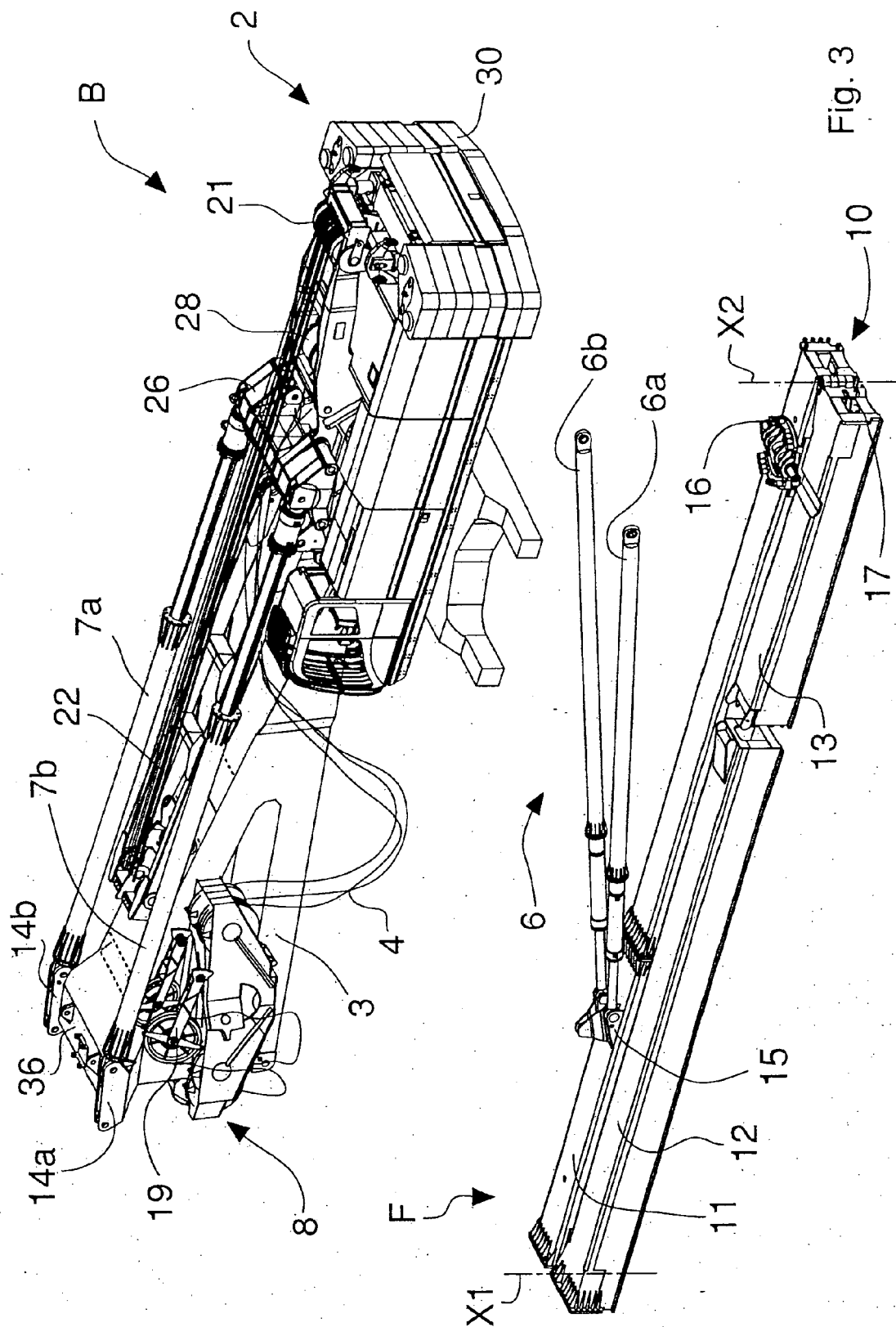


Fig. 2





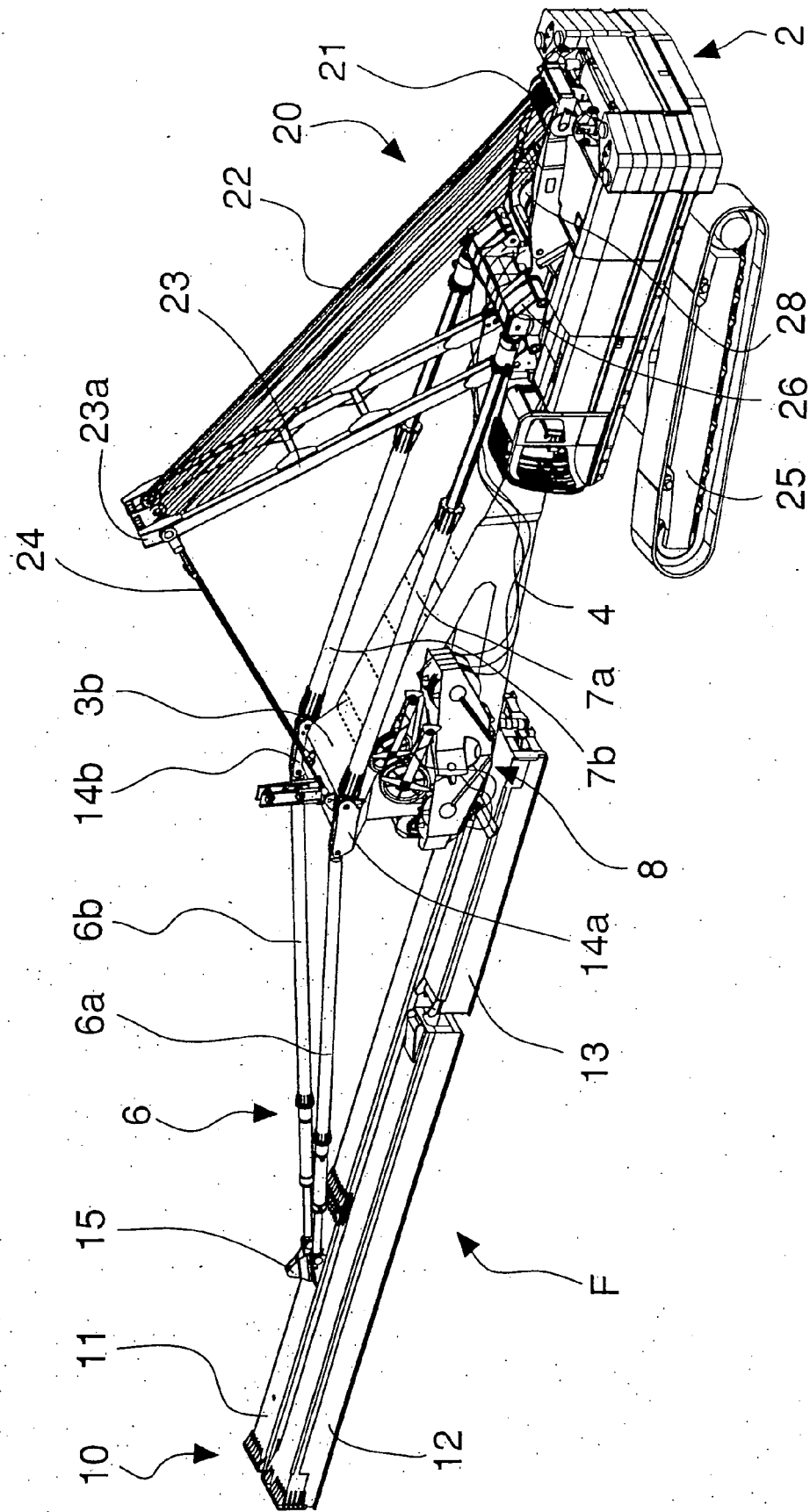


Fig. 4

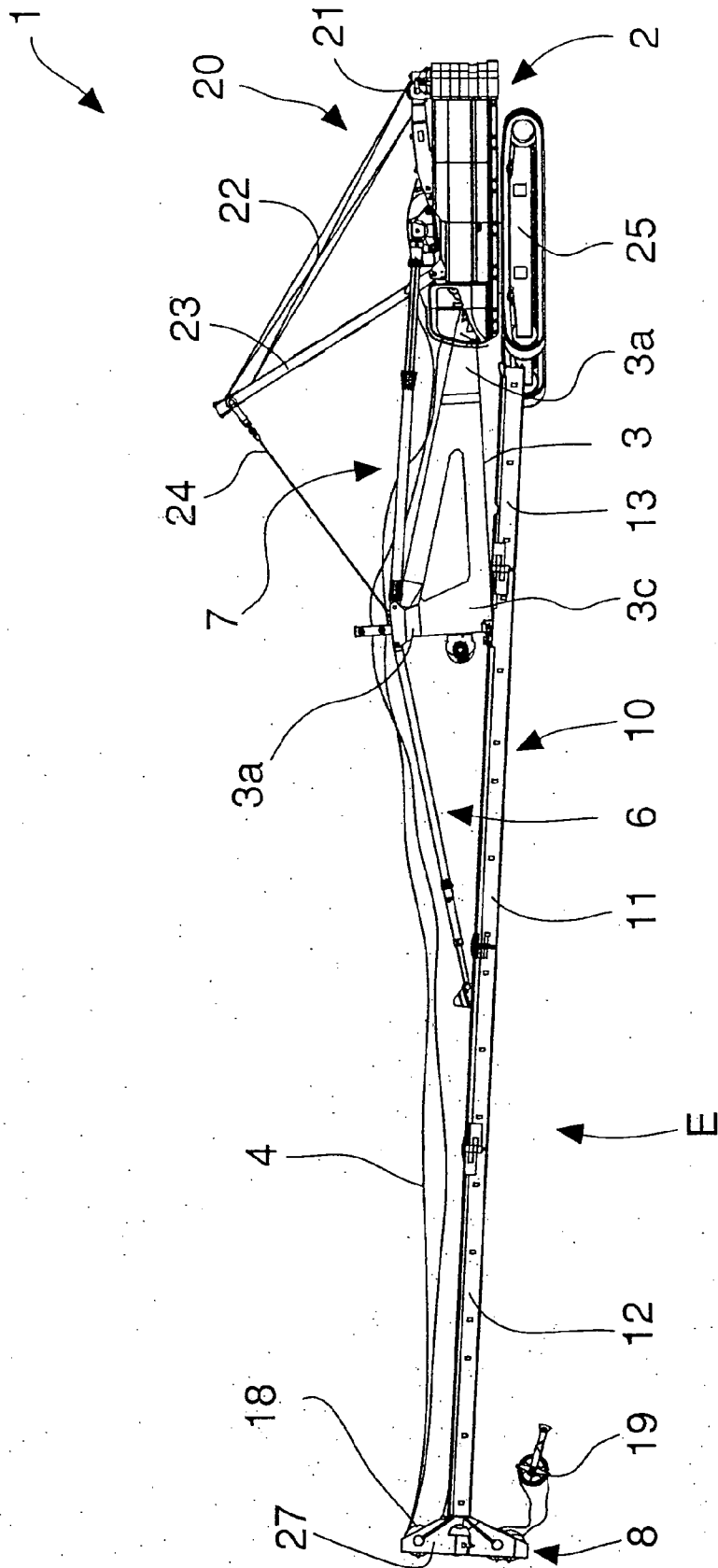
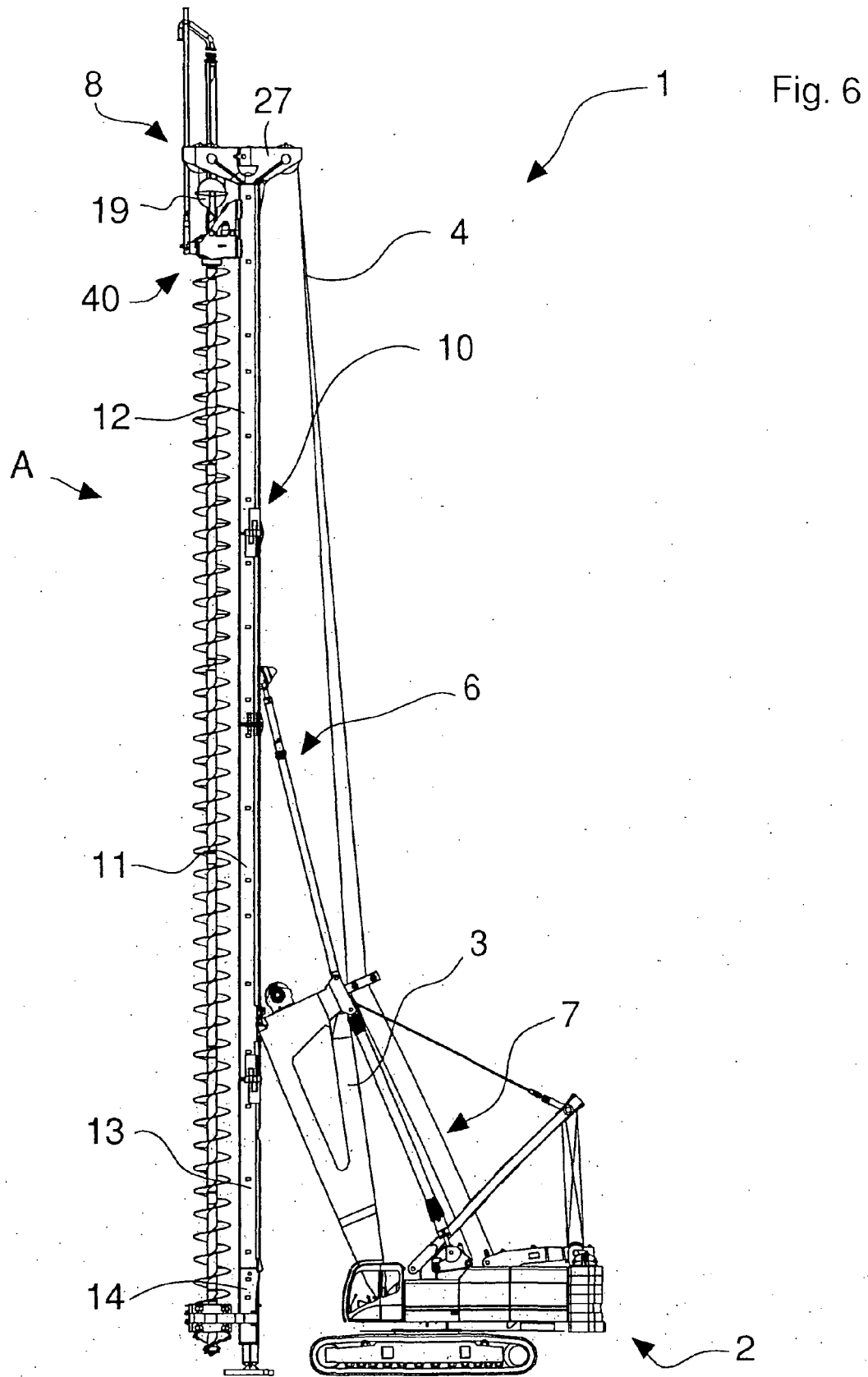


Fig. 5





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 01 4512

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 3 312 291 A (HAUG STANLEY C) 4 April 1967 (1967-04-04) * column 1, line 33 - column 1, line 45 * * column 5, line 12 - column 5, line 20 * * column 7, line 70 - column 8, line 5 * * column 9, line 17 - column 9, line 28; figures 1-20 * -----	1-50	INV. E21B7/02
X	DE 100 54 508 A1 (HARTMANN REINER [DE]) 23 May 2002 (2002-05-23) * column 1, paragraphs 2,3; claim 1 * -----	1-27	
X	WO 97/06348 A (BOLINAS TECH INC [US]) 20 February 1997 (1997-02-20) * figure 5 * -----	1,2	
Y	US 3 664 436 A (BEAGAN MICHAEL A JR) 23 May 1972 (1972-05-23) * figure 1 * -----	1,2	
Y	US 4 371 046 A (READ VERNON [US]) 1 February 1983 (1983-02-01) * column 4, line 12 - column 4, line 44; figures 1-5 * -----	1,2	TECHNICAL FIELDS SEARCHED (IPC) E21B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 17 September 2007	Examiner Manolache, Iustin
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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17-09-2007

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 3312291	A	04-04-1967	DE 1431944 A1	04-09-1969
			GB 1123631 A	14-08-1968

DE 10054508	A1	23-05-2002	NONE	

WO 9706348	A	20-02-1997	AP 1053 A	22-03-2002
			AT 253685 T	15-11-2003
			AU 721900 B2	20-07-2000
			AU 6766596 A	05-03-1997
			BR 9610071 A	30-03-1999
			CA 2235676 A1	20-02-1997
			CN 1198794 A	11-11-1998
			DE 69630606 D1	11-12-2003
			EP 0843774 A1	27-05-1998
			JP 11510575 T	14-09-1999
			NO 980528 A	06-04-1998
			NZ 315857 A	28-07-1998
			PL 324882 A1	22-06-1998
			ZA 9606727 A	18-02-1997

US 3664436	A	23-05-1972	CA 943947 A1	19-03-1974

US 4371046	A	01-02-1983	NONE	
