



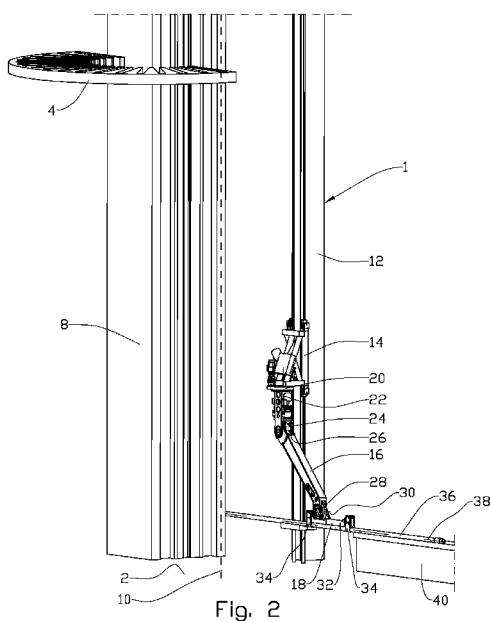
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(54) Title: PIPE HANDLING MACHINE



(57) Abstract: A pipe handling machine (1) for moving pipes (36) between a supply point, a pipe magazine (4), and a drilling centre (10), the pipe handling machine (1) including a column (12) with at least one movable carriage (14), the carriage (14) being provided with a movable arm (16) which includes a pipe gripper (18), the pipe gripper (18) being rotatable between a first position, in which a pipe (36) which is in the pipe gripper (18) has its longitudinal axis (38) in a horizontal direction, and a second position, in which the longitudinal axis (38) of the pipe (36) has a vertical direction.



PIPE HANDLING MACHINE

A pipe handling machine is provided. More particularly, it is a pipe handling machine for moving pipes between a supply point, a magazine, and a drilling centre where the pipe handling machine includes a column with at least one movable carriage, the carriage being provided with a movable arm which includes a pipe gripper.

When automating a drilling floor on which pipes and other equipment are transferred between the drilling centre and preparation and storage positions, it is desirable to be able to reduce the number of machines needed to carry out the tasks.

According to the prior art, a pipe which is typically stored in a horizontal position outside the drilling floor is first brought into a vertical position, typically by means of a pipe lift, before a pipe manipulator moves the pipe by parallel displacement into the drilling centre, for example, or into an intermediate store.

Raising a relatively long and heavy pipe between the lying and standing positions requires considerable space and calls for machines of considerable dimensions.

The invention has for its object to remedy or reduce at least one of the drawbacks of the prior art or at least provide a useful alternative to the prior art.

The object is achieved through features which are specified in the description below and in the claims that follow.

A pipe handling machine for moving pipes between a supply point, a magazine, and a drilling centre has been provided, the pipe handling machine including a column with at least one movable carriage, the carriage being provided with a movable arm including a pipe gripper, and the pipe handling machine being characterized by the pipe gripper being rotatable between a first position, in which a pipe which is in the pipe gripper has its longitudinal axis in a horizontal direction, and a second position, in which the longitudinal axis of the pipe has a vertical direction.

The pipe handling machine is thereby arranged to move a pipe from a horizontal position into a vertical position at an intermediate store or at the drilling centre.

The gripper may include two or more gripping devices spaced apart in the longitudinal direction of a gripped pipe. A steady grip around the pipe is thereby achieved, both
5 when it is being lifted from a horizontal position and when it is in a vertical position.

The arm may be rotatable relative to the carriage around a first rotational axis which is parallel to the column. When there is more than one carriage movable on the same column, the arms belonging to the different carriages may thereby be in different positions even in the horizontal plane.

10 The arm may include arm portions movable relative to each other. For example, the arm portions may be rotatable or telescopic relative to each other.

A pipe which has its longitudinal axis in a horizontal direction is typically at a drilling floor and is picked up from or brought into this position during transport from or to external areas.

15 In manners known *per se*, all displacement functions may be hydraulically or electrically activated and may be remotely controlled or automatically controlled.

Several cooperating carriages may be arranged on the same column or track, and the pipe handling machine may place and pick up pipes from other adjacent positions as well.

20 The device in accordance with the invention replaces a conventional pipe lift and the functions of a prior-art pipe manipulator. It is obvious that the omission of a pipe lift contributes to a considerable simplification of the plant, reduced need for space and reduced cost.

In what follows, an example of a preferred embodiment is described, which is visual-
25 ized in the accompanying drawings, in which:

Figure 1 shows a pipe handling machine in accordance with the invention;

Figure 2 shows, on a larger scale, a portion of the pipe handling machine of figure 1; and

Figure 3 shows a section of the pipe handling machine in another position.

30 In the drawings, the reference numeral 1 indicates a pipe handling machine which is

on a drilling floor 2 or an installation similar to a drilling floor. The pipe handling machine 1 cooperates with a pipe magazine 4 and a top-drive drilling machine 6 which is vertically movable along a tower guide 8 and which is arranged to work at a drilling centre 10.

5 The pipe handling machine 1 includes a column 12 and is, in this preferred exemplary embodiment, provided with two carriages 14 running in vertical directions along the column 12. The carriages 14 may be identical, but are arranged to be controlled independently of each other. In alternative embodiments, not shown, the column 12 may be rotatable or constituted by a structure connected to the tower guide 8.

10 Each carriage 14 is provided with a movable arm 16 which includes a pipe gripper 18. The arm 16 is connected to the carriage 14 by means of a first rotary joint 20 with a first rotational axis 22 which is parallel to the column 12, and by means of a second rotary joint 24 with a second rotational axis 26 perpendicular to the first rotational axis 22.

15 At its opposite end portion, the arm 16 is provided with a third rotary joint 28 with a third rotational axis 30 which is parallel to the second rotational axis 26. A gripping beam 32 belonging to the pipe gripper 18 is connected to the third rotary joint 28.

The gripping beam 32 of the pipe gripper 18 is provided with a gripping device 34 in the form of a gripping clamp at either one of its end portions.

20 When it is in its first position as shown in figure 2, the pipe gripper 18 is arranged to grip a pipe 36 which has its longitudinal axis 38 in a horizontal direction. The pipe 36 is fed via a conveyor 40 from a store for horizontally stored pipes 36 or from a processing position for pipes 36. The store and the processing position are not shown in the drawings. At the pipe handling machine 1, the conveyor 40 constitutes a supply
25 point for pipes 36.

When, for example, a pipe 36 is to be brought from a horizontal position and carried to the drilling centre 10 or to the pipe magazine 4, the pipe is moved in to the pipe handling machine 1 on the conveyor 40 while in its horizontal position. The gripping clamps 34 of the pipe gripper 18 grip around the pipe 36, see figure 2, after which the
30 carriage 14 is moved along the column 12 while the pipe gripper 18 is rotating the pipe around the third rotational axis 30 into a vertical direction as shown in figure 3. The other rotary joints 20, 24 are used to bring the pipe 36 into the desired position.

C l a i m s

1. A pipe handling machine (1) for moving pipes (36), the pipe handling machine (1) including a substantially vertical column (12) with at least one movable carriage (14), and the carriage (14) being provided with a movable arm (16) including a pipe gripper (18), the pipe gripper (18) being rotatable between a first position, in which a pipe (36) which is in the pipe gripper (18) has its longitudinal axis (38) in a horizontal direction, and a second position, in which the longitudinal axis (38) of the pipe (36) has a vertical direction, c h a r a c t e r i z e d i n
5
- that the pipe handling machine is arranged to grip pipes at a supply point and move pipes between the supply point, a pipe magazine (4), and a drilling centre (10), the arm (16) being rotatable in at least two dimensions and including arm portion movable relative to each other.
10
2. The pipe handling machine in accordance with claim 1, c h a r a c -
15 t e r i z e d i n that the pipe gripper (18) includes at least two gripping devices (34) spaced apart in the longitudinal direction of a gripped pipe (36).
3. The pipe handling machine in accordance with claim 1, c h a r a c -
20 t e r i z e d i n that the arm (16) is rotatable relative to the carriage (14) around a first rotational axis (22) which is parallel to the column (12).
4. The pipe handling machine in accordance with claim 1, c h a r a c -
t e r i z e d i n that a pipe (36) which has its longitudinal axis (38) in a horizontal direction is at a drilling floor (2).
5. The pipe handling machine in accordance with any one of the preceding
25 claims, c h a r a c t e r i z e d i n that the substantially vertical column (12) includes two or more movable carriages (14).

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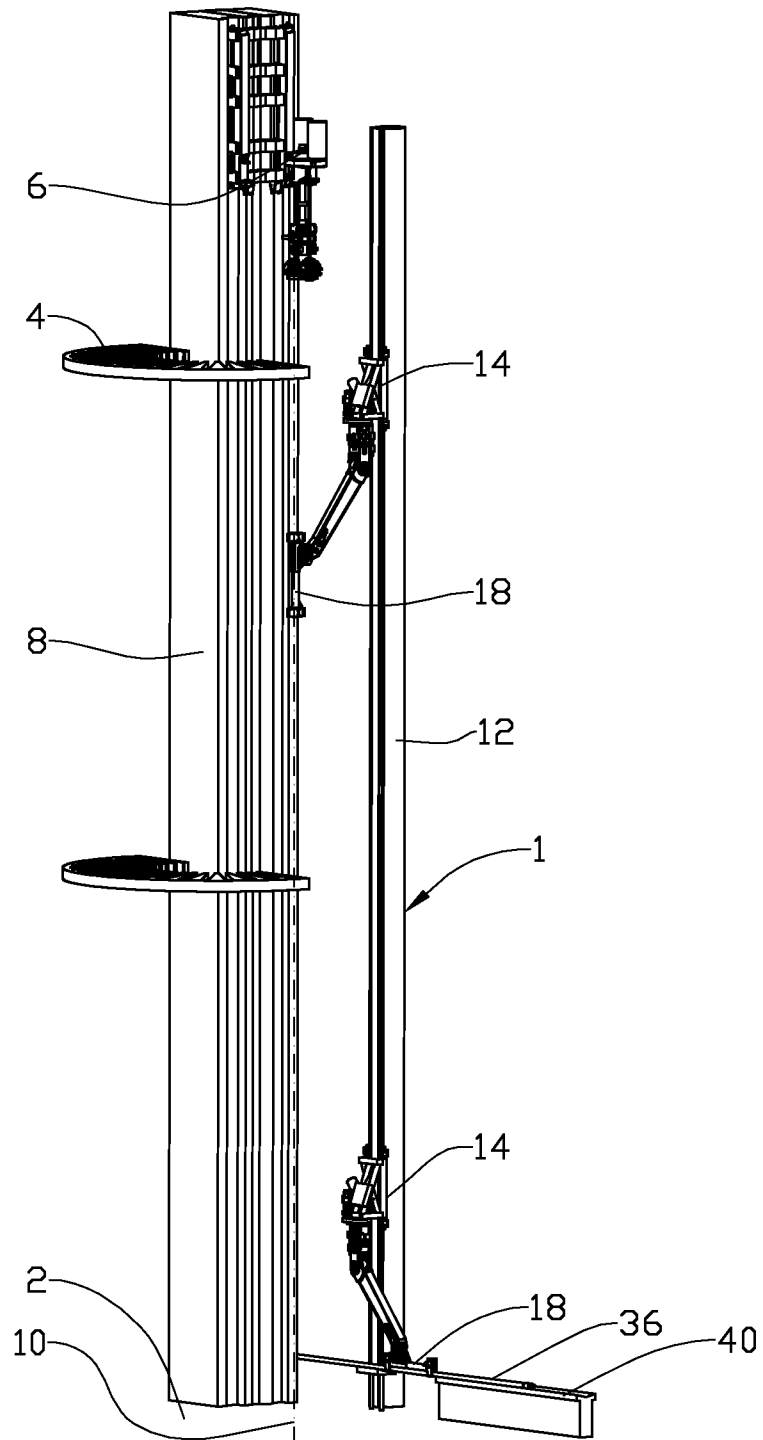


Fig. 1

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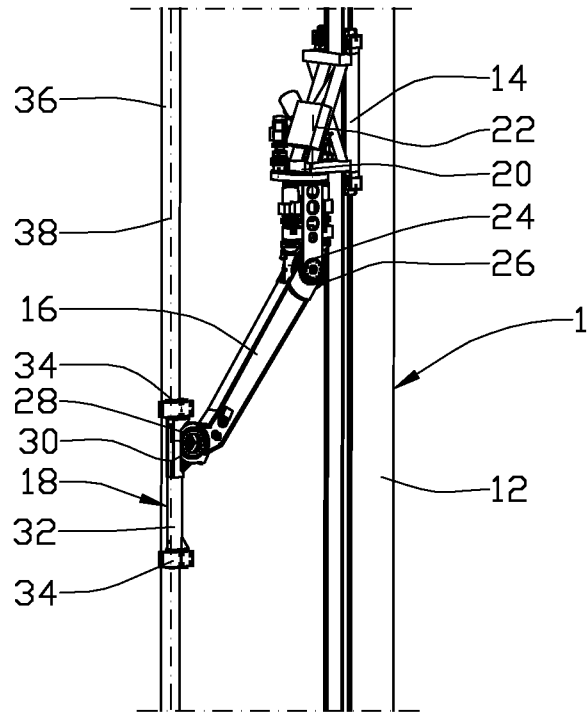


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/N02012/050074

A. CLASSIFICATION OF SUBJECT MATTER E21B19/15 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) E21B Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched DK, FI, NO, SE Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPOQUE: EPODOC, WPI		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO2004/018829 A1 (MARITIME HYDRAULICS AS [NO]) (2004.03.04) Abstracts, figures 1-8 and claims 1-4	1-5
X	WO93/15303 A1 (HEPBURN JOHN T LTD [CA]) (1993.08.05) Abstracts, figures 1, 6-10 and claims 1-5	1-4
A		5
A	WO2005/017306 A1 (MARITIME HYDRAULICS AS [NO]) (2005.02.24) The whole document	1-5
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
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Information on patent family members

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WO2004018829 A	2004.03.04	NO317081B AU2003253524	2004.08.02 2004.03.11
WO9315303 A	1993.08.05	CA2060123 A	1993.07.29
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