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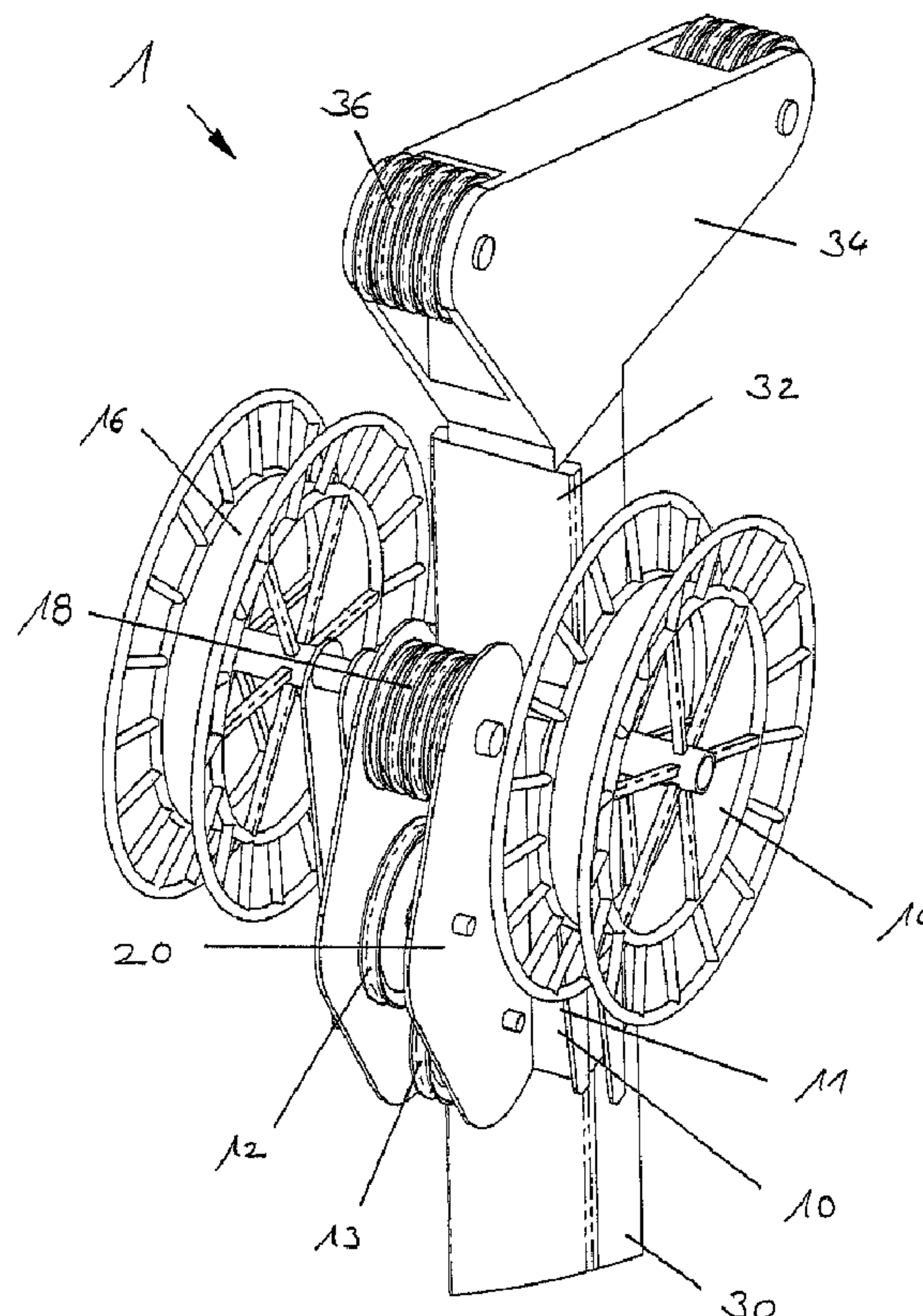
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(54) Title: SLURRY WALL CUTTING DEVICE AND SUSPENSION SLIDE FOR IT



(57) Abrégé/Abstract:

The invention relates to a slurry wall cutting device with a mast, on which is vertically movably suspended a cutting tool by means of a retaining cable and which is connected to at least one supply hose and at least one disposal hose. For improving guidance a suspension slide is provided, which is vertically displaceably guided on the mast. On the suspension slide are provided an articulation for the retaining cable and a first hose guide pulley for the supply hose and a second hose guide pulley for the disposal hose.



## ABSTRACT

The invention relates to a slurry wall cutting device with a mast, on which is vertically movably suspended a cutting tool by means of a retaining cable and which is connected to at least one supply hose and at least one disposal hose. For improving guidance a suspension slide is provided, which is vertically displaceably guided on the mast. On the suspension slide are provided an articulation for the retaining cable and a first hose guide pulley for the supply hose and a second hose guide pulley for the disposal hose.

SLURRY WALL CUTTING DEVICE AND SUSPENSION SLIDE FOR IT

This invention relates to a slurry wall cutting device with a mast, on which is vertically moveably suspended a cutting tool.  
5 The invention also relates to a suspension slide, particularly for such a slurry wall cutting device and which can be moved along a mast.

A slurry wall cutting device is known, for example from DE 87 14  
10 969 U1, which is owned by the present applicant. Such slurry wall cutting devices are used in underground engineering for producing slurry walls in the soil. Contrarotating, toothed cutting wheels break up or cut the soil and transport it to the center, where it is sucked away together with the surrounding  
15 support fluid. In a regeneration plant the fluid and soil are separated, the support fluid is pumped back, and is again available for use at the cutting location. The necessary hoses are automatically trailed along under a clearly defined tension of the cutting tool penetrating the ground.

20 The advance force of the cutting tool is produced by its dead weight. In order to avoid deflections of the cutting tool from the desired vertical cutting direction, said tool is to be kept as free as possible from transverse forces by supply hoses. In  
25 the known slurry wall cutting device this is brought about by a complicated clamping mechanism for the supply hose.

A preamble-forming slurry wall cutting device is disclosed in the brochure "Das Bauer Geräteprogramm" of April 1995. In variant BC  
30 30/CBS/HDS shown on page 11 of this brochure, a cutting tool is mounted on a mast. The cutting tool is suspended on the mast head by means of a cable. On sinking the cutting tool the hydraulic supply systems and feed hose system are trailed along by means of a hose drum system, which is located in the form of  
35 a round drum with hydraulic drive above the driver's cab. The cutting tool is suspended on the main cable which passes over the mast head. Following the sinking of the cutting tool to a given end depth and the complete unwinding of the hydraulic and feed hoses from the hose system, the hose deflection slide can be

5 moved downwardly along the mast. This makes it possible to economize hose lengths and use smaller hose wind-up systems, because the displacement path along the mast can also be used as hose length for the final cutting depth. In this known slurry wall cutting device a winch is required for the main cable of the cutting tool, a winch for the cable for displacing the slide, and a drive for winding the feed hoses onto the drum.

10 The object of the present invention is to provide a slurry wall cutting device and a suspension slide suitable for it, with which it is possible to simplify the structure of the device and at the same time ensure a reliable guidance of a cutting tool on introducing a cutting slot into the ground.

15 According to one aspect of the present invention, there is provided a slurry wall cutting device with a mast on which is vertically moveably suspended a cutting tool by an articulation of at least one retaining cable, said cutting tool being connected to at least one supply hose and at least one disposal hose, and having a suspension slide which is displaceably guided on the mast, the suspension slide having a first hose guide pulley for the supply hose and a second hose guide pulley for the disposal hose, wherein the articulation for the retaining cable is constructed on the suspension slide and, through a  
20 displacement of said suspension slide, both the cutting tool and also the supply and the disposal hoses can be trailed behind in a displaceable manner.

30 According to another aspect of the present invention, there is provided a suspension slide for use in the slurry wall cutting device as defined in accordance with the present invention, and which can be guided along a mast, wherein there is an articulation for a retaining cable, and a first hose guide pulley for a supply hose and a second hose guide pulley for a disposal hose.

35 The present invention allows a vertical guidance of the slurry wall cutting tool with high directional stability. Through the arrangement of guide pulleys on the guided suspension slide together with an articulation of the retaining cable of the

cutting tool, a parallel, uniform supply of hoses and retaining cable is ensured. The articulation can comprise one or more pulleys, as well as one or more retaining cables for the cutting tool. Through the uniform supply of retaining cable and hoses, a complicated clamping mechanism is rendered superfluous.

A particularly preferred embodiment of the invention comprises the articulation of the retaining cable having a cable guide pulley, wherein said retaining cable is guided to and fixed to the lower end of the mast. The other retaining cable end is firmly connected to the cutting tool, said retaining cable being guided by means of a guide pulley to the suspension slide. Thus, a displacement of the suspension slide, in accordance with a pulley block principle, brings about a displacement of the suspended cutting tool about the double length. The same applies regarding the supply hoses, which are guided over the guide pulleys on the suspension slide from the cutting tool to a regeneration plant on the ground or lower end region of the mast. In this embodiment it is also possible to obviate the provision of wind-up winches for the supply hoses and for the retaining cable of the cutting tool, because the entire hose or cable length is located along the mast.

In the slurry wall cutting device according to the present invention, a drive is provided for the vertical displacement of the suspension slide. At the start of the cutting process the suspension slide is normally in the upper end region of the mast. As a result of the dead weight of the suspended cutting tool, a corresponding tensile force acts downwardly on the suspension slide. Thus, a drive for vertically displacing the suspension slide must essentially apply a braking or retaining force on sinking the cutting tool, in order to ensure a controlled, downward guidance of the latter. On extracting the cutting tool, the suspension slide drive applies a corresponding torque for raising the cutting tool, together with the suspension slide.

Suitable motor and gear combinations can be provided for driving the suspension slide. It is conceivable to provide along the mast a rack with which a driving pinion on the suspension slide

is in meshing connection. However, according to the present invention it is preferable for the drive of the suspension slide to have a driving cable, which is articulated to said slide and is guided over a pulley at the mast head. The driving cable for the suspension slide can be connected to a winch at the lower end of the mast, particularly to an upper chassis or mount. The winch can also be driven by an electric, hydraulic or internal combustion engine or motor such as are conventionally used on construction machines.

A particularly reliable sinking of the cutting tool is achieved according to the invention in that on the mast is constructed a longitudinal and transverse guide for the suspension slide. On the substantially vertically directed mast can be provided guide ribs and/or guide grooves, in which are guided corresponding grooves or ribs on the suspension slide.

A particularly simple development of the slurry wall cutting device according to the present invention is obtained in that the length of the supply and disposal hoses is roughly twice the mast height. Winches or wind-up reels for taking up the supply hoses on the mast or lower chassis are consequently unnecessary. For standard mast heights of up to 20 meters, the slurry wall cutting device according to the invention can in this way produce a slurry wall to a depth of roughly 40 meters. This is adequate for most underground constructions, because only in rare cases is it necessary to sink slurry walls in even deeper regions.

Another aspect of the invention is the suspension slide, which is characterized in that an articulation for a retaining cable and a first hose guide pulley for the supply hose and a second hose guide pulley for the disposable hose are provided.

In simple manner, with such a suspension slide it is possible to reequip existing boring devices with a mast for use as slurry wall cutting devices. It is merely necessary to replace the displacement slide with the boring drive by the suspension slide according to the present invention. Onto the latter can then be suspended a cutting tool. In this way a boring device leads to a

slurry wall cutting device according to the present invention in the manner described hereinbefore. Thus, the suspension slide according to the present invention makes it possible to reduce capital expenditure for construction machines and ensures a better machine utilization, which in turn contributes to a further cost reduction.

In the case of the suspension slide according to the present invention it is advantageous to provide an articulation for a driving cable. In order to avoid overturning or tilting moments, the guide pulleys for the hoses are arranged symmetrically on either side of the suspension slide, whilst an articulation or guide pulley for the retaining cable, together with an articulation for the driving cable are located along a center axis of the suspension slide.

The invention is described in greater detail hereinafter relative to a preferred embodiment, which is diagrammatically shown in the drawing representing a perspective partial view of a slurry wall device according to the invention with a suspension slide according to the present invention.

In the case of the slurry wall cutting device 1 shown a vertical mast 30 is provided along whose front side is fitted over essentially the entire mast length a plate-like guide 32. At the upper end of the mast 30 the guide 32 ends at a mast head 34, which has a multigroove pulley 36 for a driving cable.

Along the guide 32 is displaceably mounted an inventive suspension slide 10, which comprises a base plate 11, to either side of which are fitted in rotary manner a first hose guide pulley 14 and a second hose guide pulley 16. To both hose guide pulleys 14, 16 are passed the not shown supply and disposal hoses for the cutting tool. In a central area of the base plate 11 is provided a pulley holder 20 in which for the articulation of a retaining cable for the cutting tool are mounted a guide pulley 12 and a spacing roll 13 fitted in inclined manner under the latter.

The not shown retaining cable for the cutting tool is fixed to a lower end of the mast 30 and is guided along the latter to the guide pulley 12, the other retaining cable end being connected to the cutting tool. The spacing roll 13 ensures an adequate distance between the retaining cable and the mast 30. Correspondingly the supply and disposal hoses are passed via the two hose guide pulleys 14, 16 from an upper chassis at the lower end of the mast 30 to the cutting tool.

A displacement of the suspension slide 10 along the guide 32 of the mast 30 is brought about by a not shown driving cable, which passes over a multigroove pulley as articulation 18 in the pulley holder 20 and a corresponding guide pulley 36 on the mast head 34 to a winch on the lower chassis of the slurry wall cutting device 1.

If the driving cable is released, the slide can be lowered by one metre. As a result of the inventive articulation of the retaining cable at the lower end of the mast 30 and the guidance of the cable via the cable guide pulley 12 on the suspension slide 10, the cutting tool is lowered by twice the length, i.e. by 2 metres. Through the corresponding arrangement of the supply and disposal hoses, they are trailed along by the same length parallel to the cutting tool retaining cable. This avoids undesired transverse forces on the cutting tool and simultaneously a separate clamping mechanism for the hoses is rendered superfluous. In addition, for standard mast lengths of up to 20 metres, there is no need for complicated hose wind-up devices, because with the arrangement according to the invention hose lengths of approximately 40 metres are housed on the mast 30.

As a result of the present invention the construction of a slurry wall cutting device is simplified, accompanied by a simultaneous improvement to the cutting tool guidance. Through a suspension slide according to the present invention, it is possible to reequip conventional cutting devices with a boring mast for the production of slurry walls.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A slurry wall cutting device with a mast on which is vertically moveably suspended a cutting tool by an articulation of at least one retaining cable, said cutting tool being connected to at least one supply hose and at least one disposal hose, and having a suspension slide which is displaceably guided on the mast, the suspension slide having a first hose guide pulley for the supply hose and a second hose guide pulley for the disposal hose, wherein the articulation for the retaining cable is constructed on the suspension slide and, through a displacement of said suspension slide, both the cutting tool and also the supply and the disposal hoses can be trailed behind in a displaceable manner.
2. The slurry wall cutting device according to claim 1, wherein the articulation of the retaining cable has a cable guide pulley and the retaining cable is led and fixed to the lower end of the mast.
3. The slurry wall cutting device according to claim 1 or 2, wherein there is a drive for the vertical displacement of the suspension slide.
4. The slurry wall cutting device according to claim 3, wherein the drive of the suspension slide has a driving cable, which is articulated to the suspension slide and guided by means of a pulley on the head of the mast.
5. The slurry wall cutting device according to any one of claims 1 to 4, wherein a longitudinal and transverse guide for the suspension slide is constructed on the mast.
6. The slurry wall cutting device according to any one of claims 1 to 5, wherein the length of the supply and disposal hoses is approximately twice the height of the mast.

7. A suspension slide for use in the slurry wall cutting device as defined in any one of claims 1 to 6, and which can be guided along a mast, wherein there is an articulation for a retaining cable, and a first hose guide pulley for a supply hose and a second hose guide pulley for a disposal hose.

8. The suspension slide according to claim 7, wherein an articulation for a driving cable is provided.

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