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(54) COMBINED-TYPE DRIVING SLEEVE OF DRILLING RIG WITH RELIABLY FIXED DRAW KEY

(57) The invention disclose a combined driving sleeve of a drilling rig with a reliably fixed draw key, which comprises: a driving sleeve body (1), a draw key (2), a fixed stopper block (6), a movable stopper block (7), and bolts (8), the fixed stopper block (6) is fixed at one end of a groove of the driving sleeve body (1), while the movable stopper block (7) is fixed at the other end of the groove of the driving sleeve body (1) by means of a bolt (8), and the draw key (2) is fixed into the groove of the driving sleeve body (1) by means of the fixed stopper block (6) and the movable stopper block (7). The advantages thereof are: the draw key is reliably fixed and will not easily come loose; the method of mounting the draw key of the driving sleeve is simple and manufacturing costs are low; the operating space for replacing the draw key is large, and labor intensity is low; and the draw key is longitudinally symmetrical and can be inverted and interchanged.

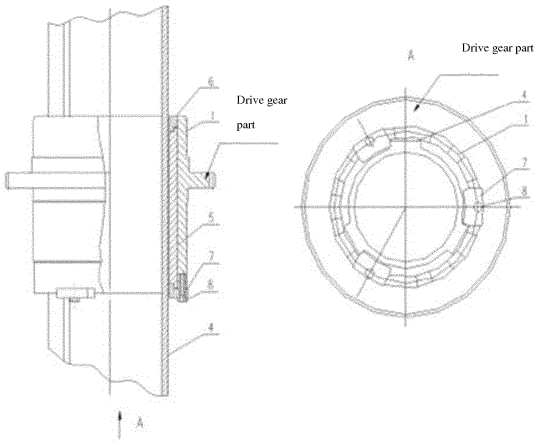

Fig. 2

EP 3 135 853 A1

Description

Technical Field

[0001] The present invention relates to the technical field of drilling rigs, and more particularly to a combined driving sleeve of a drilling rig with a reliably fixed draw key.

Background

[0002] The working process of a power head driving sleeve of a drill machine, for example, the commonly-used rotary drilling rig, for pile foundation construction comprises: the driving gear of a gear box drives a drive gear connected with a driving sleeve body to rotate, and then a drill rod inserted in an inner hole is driven to rotate together by a plurality of draw keys fixed in the inner-hole groove of the driving sleeve. The driving sleeve and the drill rod typically fit with each other by use of a key groove structure. In the construction process, a key bar on the drill rod frequently rubs against the key groove of the driving sleeve, and thus is prone to wear and needs to be replaced and repaired. There are two kinds of driving sleeves in the market at present, in which one is an integrated driving sleeve that has an inner cavity machined into the form of a key groove capable of directly fitting with a drill rod, is a single part with a simple structure and needs to be replaced integrally after its excessive wear with relatively high cost; the other one is a combined driving sleeve, i.e., it is assembled with a driving sleeve body, a relevant draw key, a stopper block, bolts and the like. Such a combined driving sleeve is relatively low in cost because only the draw key may be separately replaced after the key bar is worn down, and then the service life of the expensive driving sleeve body is prolonged.

[0003] The structure of the existing traditional combined driving sleeve is that the draw key is fixed in the inner-hole groove of the driving sleeve by means of a plurality of rows of bolts distributed on the draw key. Such a structure has the following problems: complicated threaded hole machining with high accuracy requirement; unreliably fixed and easily loosening and falling draw keys; complicated mounting and dismounting, demand on dismounting and mounting of dozens of bolts in the narrow-space inner holes of the driving sleeve of replacement, which results in high labor intensity and consumes long time.

Summary

[0004] The technical problem to be solved by the present invention is that the draw key of the combined driving sleeve of a drilling rig in the prior art are fixed not reliably, prone to loosen and fall, and complicated in dismounting; therefore, there is a need to provide a combined driving sleeve of a drilling rig with a reliably fixed draw key.

[0005] In order to solve the above technical problems, the present invention provides a combined driving sleeve of a drilling rig with a reliably fixed draw key. The driving sleeve comprises: a driving sleeve body, a draw key, a fixed stopper block, a movable stopper block, and bolts. The fixed stopper block is fixed at one end of a groove of the driving sleeve body, while the movable stopper block is fixed at the other end of the groove of the driving sleeve body by means of a bolt, and the draw key is fixed in the groove of the driving sleeve body by means of the fixed stopper block.

[0006] Preferably, the draw key is longitudinally symmetrical.

[0007] Preferably, the fixed stopper block at one end of the groove of the driving sleeve body is replaced by a movable stopper block.

[0008] Preferably, one or more stopper steps in a certain matching relation with each other are machined on each of the draw key, the fixed stopper block and the movable stopper block.

[0009] Preferably, each stopper step is a bevel or a combination of a bevel and a plane.

[0010] The present invention has the following advantages:

the combined driving sleeve of a drilling rig with a reliably fixed draw key provided by the present invention is fixed reliably, simple in structure, stable to operate, convenient to repair, and low in manufacturing cost in comparison with the combined driving sleeve of a drilling rig in the prior art.

Brief Description of the Drawings

[0011]

Fig. 1 is a structural schematic diagram of a driving sleeve of a rotary drilling rig commonly used for pile foundation construction at present.

Fig. 2 is a schematic diagram of a fixed structure of a draw key in a combined driving sleeve of the present invention.

Fig. 3 is a structural schematic diagram of a combined driving sleeve of the present invention with stopper blocks at both ends being movable stopper blocks.

Fig. 4 is a structural schematic diagram of a combined driving sleeve of the present invention with more than two stopper steps on stopper blocks.

Fig. 5 is a structural schematic diagram of a combined driving sleeve of the present invention with each stopper step of each stopper block being a bevel or a combination of a bevel and a plane.

[0012] Reference numerals in the drawings: 1, driving

sleeve body, 2, draw key, 3, bolt, 4, drill rod, 5, draw key, 6, fixed stopper block, 7, movable stopper block, and 8, bolt.

Detailed Description of the Preferred Embodiments

[0013] The following embodiments are intended for illustrating the present invention, rather than limiting the scope of the present invention.

[0014] As shown in Fig. 1, the structure of an existing combined driving sleeve is that a draw key 2 is mounted in the groove of a driving sleeve body 1 via a bolt 3, with fixed stopper blocks 6 at upper and lower ends. Such a structure has the following problems: it is difficult to machine; it is difficult and expensive to machine dozens of fixing holes for bolts 3 in the driving sleeve body 1 and the draw key 2 with strict requirement on position tolerance of the holes. In addition, the problem of leakage of lubricating oil from a gear box outside the driving sleeve body via the bolt holes may also need to be solved; the way of fixing the draw key is unreliable, leading to easy loosening and falling and thus a construction stop failure; the detachment and replacement are complicated; for replacement, dozens of bolts need to be detached and mounted in the narrow-space inner holes of the driving sleeve, which results in high labor intensity and consumes long time.

[0015] Fig. 2 shows the way of mounting the draw key of the combined driving sleeve of the present invention. A fixed stopper block 6 is fixed at one end of the groove of a driving sleeve body 1, while a movable stopper block 7 is fixed at the other end of the groove of the driving sleeve body by means of a bolt 8. A draw key 5 is fixed in the groove of the driving sleeve body 1 by the fixed stopper block 6 and the movable stopper block 7. Steps in a certain matching relation with each other are machined on each of the draw key 5, the fixed stopper block 6 and the movable stopper block 7, and the two ends of the draw key 5 are fixed in the groove simply and reliably by the fixed stopper block 6 and the movable stopper block 7 with the stopper steps. A drive gear is connected to the combined driving sleeve. A drill rod 4 is inserted into the combined driving sleeve, and torque and pressure are transferred by means of a key on the drill rod 4 and the draw key 5 of the combined driving sleeve.

[0016] The draw key 5 may be manufactured into a symmetrical structure so as to be inverted during mounting.

[0017] During working, a motor reducer in a power head drives a driving gear to rotate, and the driving gear drives the drive gear to cause rotation of the combined driving sleeve along with the drill rod.

[0018] The draw key 5 needs to be replaced after being worn down to a certain degree. The replacement can be achieved by only removing the bolt 8. The working space for removing the bolt is large. In addition, typically, only 1 to 3 bolts 8 are disposed on one single movable stopper block 7, providing simple and convenient operation.

[0019] From Fig. 2, the combined driving sleeve of the present invention is relatively simple in machining. It only needs to machine each of the stopper blocks and the draw key into the form of stopper steps without bolt holes machined in the draw key 5 and the driving sleeve body 1. The way of fixing is simple and reliable. The operating space for replacing the draw key 5 is large. Few bolts 8 are detached. It is also convenient for moment screwing on the bolts.

[0020] The mounting form of the draw key of the combined driving sleeve of the present invention further includes the following structures.

[0021] As shown in Fig. 3, the combined driving sleeve of the present invention is not limited to the form of being fixed at one end and movable at the other end, and may be designed into a structure form with the stopper blocks at both ends being the movable stopper blocks 7.

[0022] As shown in Fig. 4, the stopper steps of the stopper blocks of the combined driving sleeve of the present invention may be a multi-step structure of more than two steps.

[0023] As shown in Fig. 5, each of the stopper steps of the stopper blocks of the combined driving sleeve provided by the present invention may be in the form of a bevel or the combination of a bevel and a plane.

[0024] The above embodiments are merely intended for describing the preferred implementations of the present invention, rather than limiting the scope of the present invention. Various modifications and improvements made by a person of ordinary skill in the art to the technical solutions of the present invention should all fall into the protection scope defined by the claims of the present invention.

Industrial Applicability

[0025] The combined driving sleeve of a drilling rig with a reliably fixed draw key of the present invention comprises the driving sleeve body, the draw key, the fixed stopper block, the movable stopper block, and the bolts. Compared with the combined driving sleeve of a drilling rig in the prior art, the combined driving sleeve of a drilling rig with a reliably fixed draw key of the present invention is reliable in fixation, simple in structure, stable to operate, convenient to repair, and low in manufacturing cost. Hence, the combined driving sleeve of a drilling rig with a reliably fixed draw key of the present invention is very considerable in economic and social benefits.

Claims

1. A combined driving sleeve of a drilling rig with a reliably fixed draw key, comprising: a driving sleeve body, a draw key, a fixed stopper block, a movable stopper block, and bolts, wherein the fixed stopper block is fixed at one end of a groove of the driving sleeve body, while the movable stopper block is fixed

at the other end of the groove of the driving sleeve body by means of a bolt, and the draw key is fixed into the groove of the driving sleeve body by means of the fixed stopper block and the movable stopper block.

2. The combined driving sleeve of a drilling rig with a reliably fixed draw key according to claim 1, **characterized in that** the draw key is longitudinally symmetrical.

3. The combined driving sleeve of a drilling rig with a reliably fixed draw key according to claim 1, **characterized in that** the fixed stopper block at one end of the groove of the driving sleeve body is replaced by the movable stopper block.

4. The combined driving sleeve of a drilling rig with a reliably fixed draw key according to any one of claims 1-3, **characterized in that** one or more stopper steps in a certain matching relation with each other are machined on each of the draw key, the fixed stopper block and the movable stopper block.

5. The combined driving sleeve of a drilling rig with a reliably fixed draw key according to claim 4, **characterized in that** each stopper step is a bevel or a combination of a bevel and a plane.

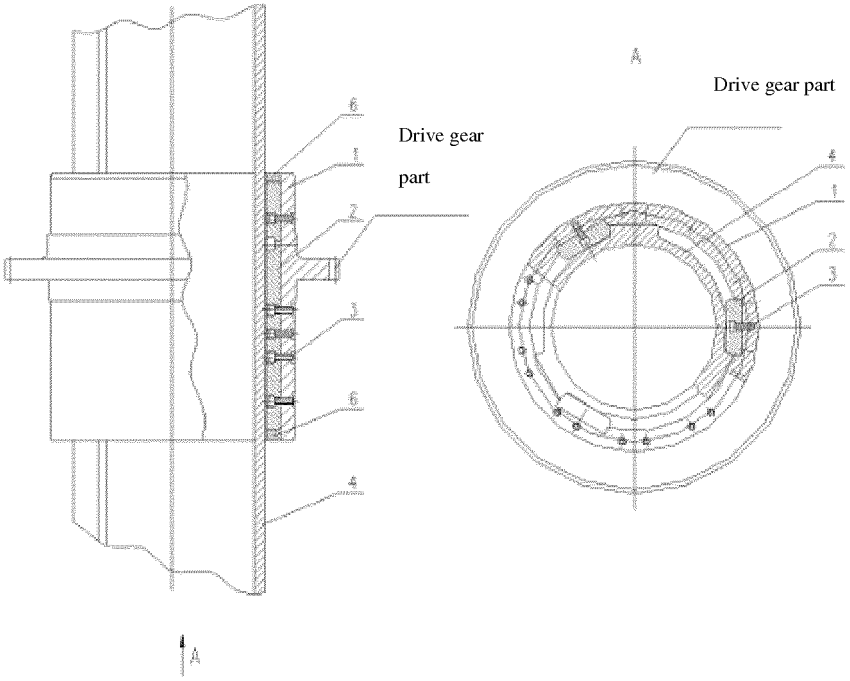

Fig. 1

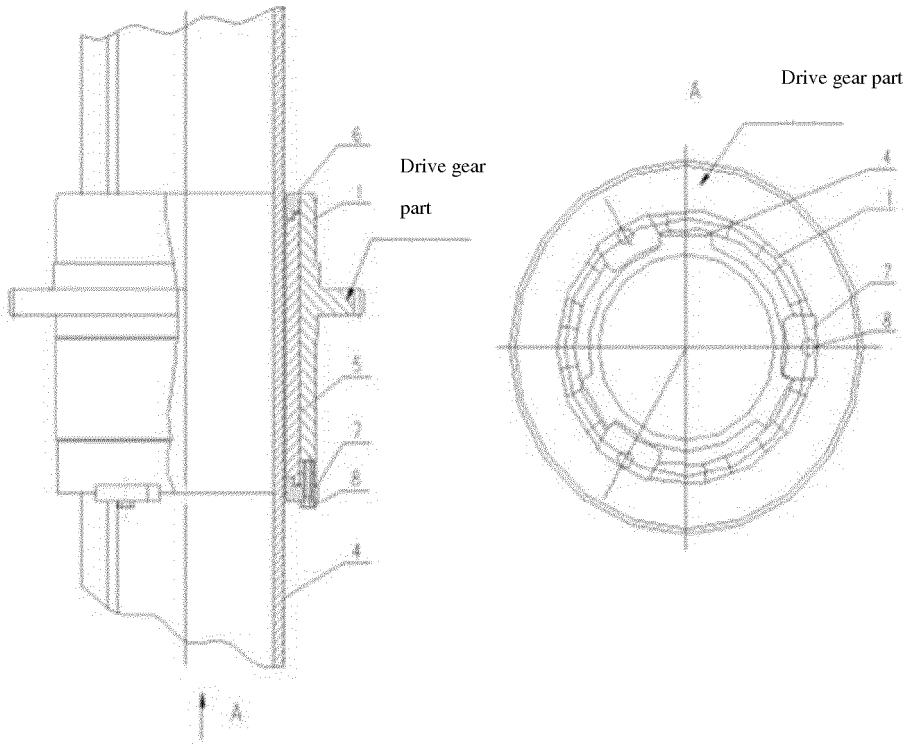

Fig. 2

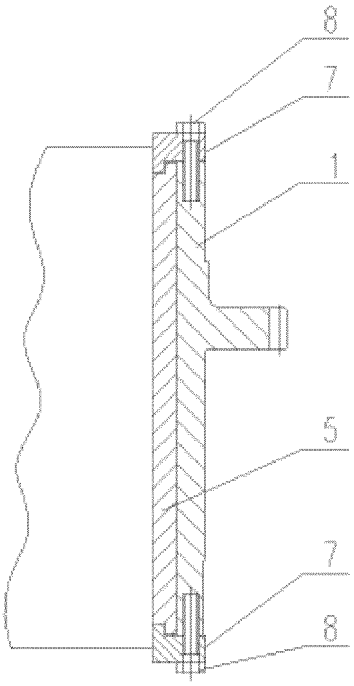

Fig. 3

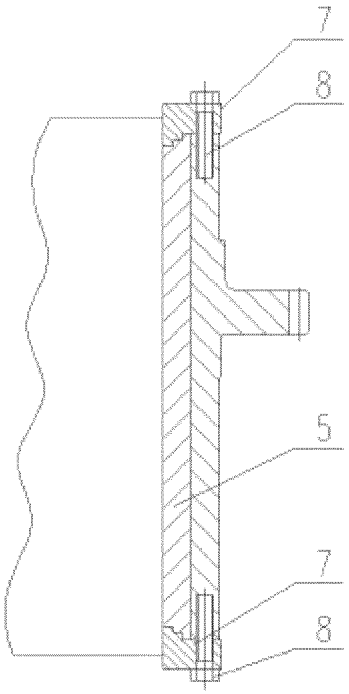

Fig. 4

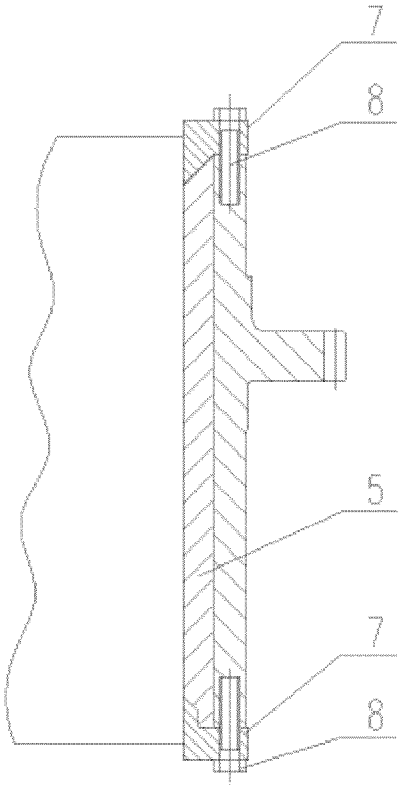

Fig. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2014/094943

A. CLASSIFICATION OF SUBJECT MATTER

E21B 3/02 (2006.01) i; E21B 17/03 (2006.01) i
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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CPRS, CPRSABS, EPODOC, WPI: bolt, drill, detach+, spline, sleeve, pipe, drive, head, groove, key, rotary, gear, joint, connect etc.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 103924916 A (SUNWARD INTELLIGENT EQUIP CO LTD) 16 July 2014 (16.07.2014) see claims 1-5	1-5
X	CN 103277040 A (GAOYOU HENGHUI MACHINERY CO., LTD.) 04 September 2013 (04.09.2013) see description, paragraph [0008], figure 1	1-5
A	CN 203188903 U (XUZHOU XUGONG FOUNDATION CONSTRUCTION MACHINERY CO LTD) 11 September 2013 (11.09.2013) see the whole document	1-5
A	CN 203201490 U (XIAMEN XGMA MACHINERY CO LTD) 18 September 2013 (18.09.2013) see the whole document	1-5

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

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"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

Date of the actual completion of the international search	Date of mailing of the international search report
12 March 2015	25 March 2015

Name and mailing address of the ISA	Authorized officer
State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	WANG, Yanqin Telephone No. (86-10) 62086940

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2014/094943

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 202627984 U (SHANGHAI ZOOMLION HEAVY INDUSTRY PILING MACHINERY CO LTD et al.) 26 December 2012 (26.12.2012) see the whole document	1-5

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2014/094943

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 103924916 A	16 July 2014	None	
CN 103277040 A	04 September 2013	None	
CN 203188903 U	11 September 2013	None	
CN 203201490 U	18 September 2013	None	
CN 202627984 U	26 December 2012	None	

Form PCT/ISA /210 (patent family annex) (July 2009)