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

KOMBINIERTE ANTRIEBSHÜLSE VON BOHRANLAGEN MIT SICHER BEFESTIGTEM ZIEHKEIL  
 MANCHON D'ENTRAÎNEMENT DE TYPE COMBINÉ D'UN APPAREIL DE FORAGE AYANT UNE CLAVETTE MOBILE FIXÉE DE MANIÈRE FIABLE

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(72) Inventor: **HE, Qinghua**  
**Changsha**  
**Hunan 410100 (CN)**

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(74) Representative: **Raffay & Fleck**  
**Patentanwälte**  
**Grosse Bleichen 8**  
**20354 Hamburg (DE)**

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(73) Proprietor: **Sunward Intelligent Equipment Co., Ltd.**  
**Economic and Technological Development Zone**  
**Changsha**  
**Hunan 410100 (CN)**

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## 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, known e.g. from CN 103 590 755 A, 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.

[0004] It is further known from CN 201 802 307 U that movable stopper blocks are fixed by a movable supporting ring that is mounted inside the driving sleeve..

### Summary

[0005] 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 com-

bined driving sleeve of a drilling rig with a reliably fixed draw key.

[0006] 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 combined driving sleeve comprises: a driving sleeve body, a draw key, a fixed stopper block, a movable stopper block having a bolt hole, and bolts. The driving sleeve body has a longitudinal axis, two longitudinal ends, a groove extending in a longitudinal direction on a radial inner surface from one longitudinal end to the second longitudinal end of the driving sleeve body, a body thickness bounded by the inner surface and a radial outer surface of the driving sleeve body, and a bolt hole extending through the body thickness in the longitudinal direction of the driving sleeve body. 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. To fix the movable stopper block at the other end of the groove, the bolt is introduced first through the movable stopper block hole before being introduced into the driving sleeve body bolt hole

[0007] Preferably, the draw key is longitudinally symmetrical.

[0008] Preferably, the fixed stopper block at one end of the groove of the driving sleeve body is replaced by a movable stopper block.

[0009] 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.

[0010] Alternatively, one or more stopper steps in a certain matching relation with each other are machined on each of the draw key and the movable stopper blocks.

[0011] Preferably, each stopper step is a bevel or a combination of a bevel and a plane.

[0012] 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

[0013]

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.

**[0014]** 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

**[0015]** The following embodiments are intended for illustrating the present invention, rather than limiting the scope of the present invention.

**[0016]** 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.

**[0017]** 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.

**[0018]** The draw key 5 may be manufactured into a symmetrical structure so as to be inverted during mounting.

**[0019]** 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.

**[0020]** 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.

**[0021]** 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.

**[0022]** The mounting form of the draw key of the combined driving sleeve of the present invention further includes the following structures.

**[0023]** 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.

**[0024]** 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.

**[0025]** 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.

**[0026]** 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

**[0027]** 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 (5), comprising:

a driving sleeve body (1) having a longitudinal axis, two longitudinal ends, a groove extending in a longitudinal direction on a radial inner surface from one longitudinal end to the second longitudinal end of the driving sleeve body, a body thickness bounded by the inner surface and a radial outer surface of the driving sleeve body, and a bolt hole extending in the body thickness in the longitudinal direction of the driving sleeve body;

a draw key (5) sized to protrude radially inward from the groove;

a fixed stopper block (6);

a movable stopper block (7) having a bolt hole; and

a bolt (8);

wherein the fixed stopper block is fixed at one end of the 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 the 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;

**characterized in that**, to fix the movable stopper block at the other end of the groove, the bolt is introduced first through the movable stopper block hole before being introduced into the driving sleeve body bolt hole.

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 the one end of the groove of the driving sleeve body is replaced by a movable stopper block.

4. The combined driving sleeve of a drilling rig with a reliably fixed draw key according to any one of claims 1-2, **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 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 and the movable stopper blocks.

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

## Patentansprüche

1. Kombinierte Antriebshülse einer Bohranlage mit einem sicher befestigten Ziehkeil (5), umfassend:

einen Antriebshülsekörper (1) mit einer Längsachse, zwei Längsenden, einer sich in einer Längsrichtung auf einer radialen Innenfläche von einem Längsende zu dem zweiten Längsende des Antriebshülsekörpers erstreckenden Nut, einer Körperdicke, die durch die Innenfläche und eine radiale Außenfläche des Antriebshülsekörpers begrenzt ist, und ein Schraubenloch, das sich in der Körperdicke in der Längsrichtung des Antriebshülsekörpers erstreckt; einen Ziehkeil (5), der so bemessen ist, dass er von der Nut radial nach innen vorsteht; einen befestigten Anschlagblock (6); einen bewegbaren Anschlagblock (7) mit einem Schraubenloch; und eine Schraube (8);

wobei der befestigte Anschlagblock an einem Ende der Nut des Antriebshülsekörpers befestigt ist, während der bewegbare Anschlagblock an dem anderen Ende der Nut des Antriebshülsekörpers mittels der Schraube befestigt ist, und der Ziehkeil in der Nut des Antriebshülsekörpers mittels des befestigten Anschlagblocks und des bewegbaren Anschlagblocks befestigt; **dadurch gekennzeichnet, dass** zum Befestigen des Anschlagblocks an dem anderen Ende der Nut die Schraube zuerst durch das Loch des bewegbaren Anschlagblocks eingeführt wird, bevor sie in das Schraubenloch des Antriebshülsekörpers eingeführt wird.

2. Kombinierte Antriebshülse einer Bohranlage mit einem sicher befestigten Ziehkeil nach Anspruch 1, **dadurch gekennzeichnet, dass** der Ziehkeil längssymmetrisch ist.

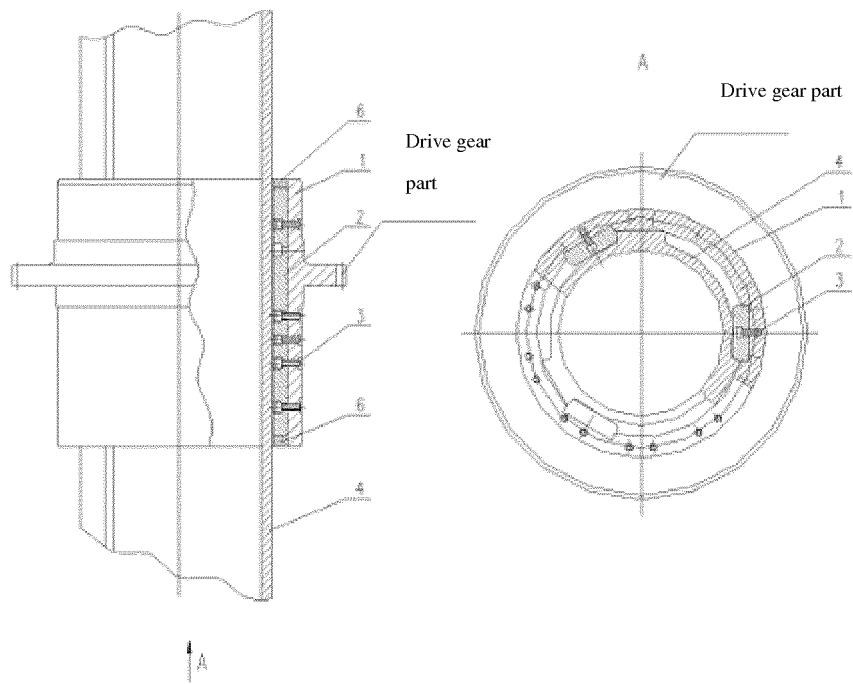
3. Kombinierte Antriebshülse einer Bohranlage mit einem sicher befestigten Ziehkeil nach Anspruch 1, **dadurch gekennzeichnet, dass** der befestigte Anschlagblock an dem einen Ende der Nut des Antriebshülsekörper durch einen bewegbaren Anschlagblock ersetzt ist. 5
4. Kombinierte Antriebshülse einer Bohranlage mit einem sicher befestigten Ziehkeil nach einem der Ansprüche 1-2, **dadurch gekennzeichnet, dass** eine oder mehrere Anschlagstufen in einem bestimmten passenden Verhältnis zueinander an jedem von dem Ziehkeil, dem befestigten Anschlagblock und dem bewegbaren Anschlagblock eingearbeitet sind. 10
5. Kombinierte Antriebshülse einer Bohranlage mit einem sicher befestigten Ziehkeil nach Anspruch 3, **dadurch gekennzeichnet, dass** eine oder mehrere Anschlagstufen in einem bestimmten passenden Verhältnis zueinander an jedem von dem Ziehkeil und den bewegbaren Anschlagblöcken eingearbeitet sind. 20
6. Kombinierte Antriebshülse einer Bohranlage mit einem sicher befestigten Ziehkeil nach Anspruch 4 oder Anspruch 5, **dadurch gekennzeichnet, dass** jede Anschlagstufe eine Abschrägung oder eine Kombination von einer Abschrägung und einer Ebene ist. 25

### Revendications

1. Manchon d'entraînement de type combiné d'un appareil de forage avec une clavette mobile (5) fixée de manière fiable, comprenant : 35
- un corps de manchon d'entraînement (1) ayant un axe longitudinal, deux extrémités longitudinales, une rainure s'étendant dans une direction longitudinale sur une surface intérieure radiale d'une extrémité longitudinale à la seconde extrémité longitudinale du corps de manchon d'entraînement, une épaisseur de corps délimitée par la surface intérieure et une surface extérieure radiale du corps de manchon d'entraînement, et un trou de boulon s'étendant dans l'épaisseur du corps dans la direction longitudinale du corps de manchon d'entraînement; 40
- une clavette mobile (5) dimensionnée de manière à faire saillie radialement vers l'intérieur de la rainure; 45
- un bloc d'arrêt fixe (6);
- un bloc d'arrêt mobile (7) comportant un trou de boulon; et 50
- un boulon (8); 55
- dans lequel le bloc d'arrêt fixe est fixé à une extrémité de la rainure du corps du manchon

d'entraînement, tandis que le bloc d'arrêt mobile est fixé à l'autre extrémité de la rainure du corps du manchon d'entraînement au moyen du boulon, et la clavette mobile est fixée dans la rainure du corps du manchon d'entraînement au moyen du bloc d'arrêt fixe et du bloc d'arrêt mobile; **caractérisé en ce que**, pour fixer le bloc d'arrêt mobile à l'autre extrémité de la rainure, le boulon est d'abord introduit à travers le trou du bloc d'arrêt mobile avant d'être introduit dans le trou du boulon du corps du manchon d'entraînement.

2. Manchon d'entraînement de type combiné d'un appareil de forage avec une clavette mobile fixée de manière fiable selon la revendication 1, **caractérisé en ce que** la clavette mobile est symétrique dans le sens longitudinal.
3. Manchon d'entraînement de type combiné d'un appareil de forage avec une clavette mobile fixée de manière fiable selon la revendication 1, **caractérisé en ce que** le bloc d'arrêt fixe à une extrémité de la rainure du corps du manchon d'entraînement est remplacé par un bloc d'arrêt mobile.
4. Manchon d'entraînement combiné d'un appareil de forage avec une clavette mobile fixée de manière fiable selon l'une quelconque des revendications 1-2, **caractérisé en ce que** un ou plusieurs gradins de butée dans une certaine relation de correspondance les uns avec les autres sont usinés sur chacune des clavettes mobiles, le bloc de butée fixe et le bloc de butée mobile.
5. Manchon d'entraînement combiné d'un appareil de forage avec une clavette mobile fixe fiable selon la revendication 3, **caractérisé en ce que** une ou plusieurs butées d'arrêt dans une certaine relation de correspondance les unes avec les autres sont usinées sur chacune des clavettes mobiles et des blocs d'arrêt mobiles.
6. Manchon d'entraînement combiné d'un appareil de forage avec une clavette mobile fixée de manière fiable selon la revendication 4 ou la revendication 5, **caractérisé en ce que** chaque cran d'arrêt est un biseau ou une combinaison d'un biseau et d'un plan.



**Fig. 1**

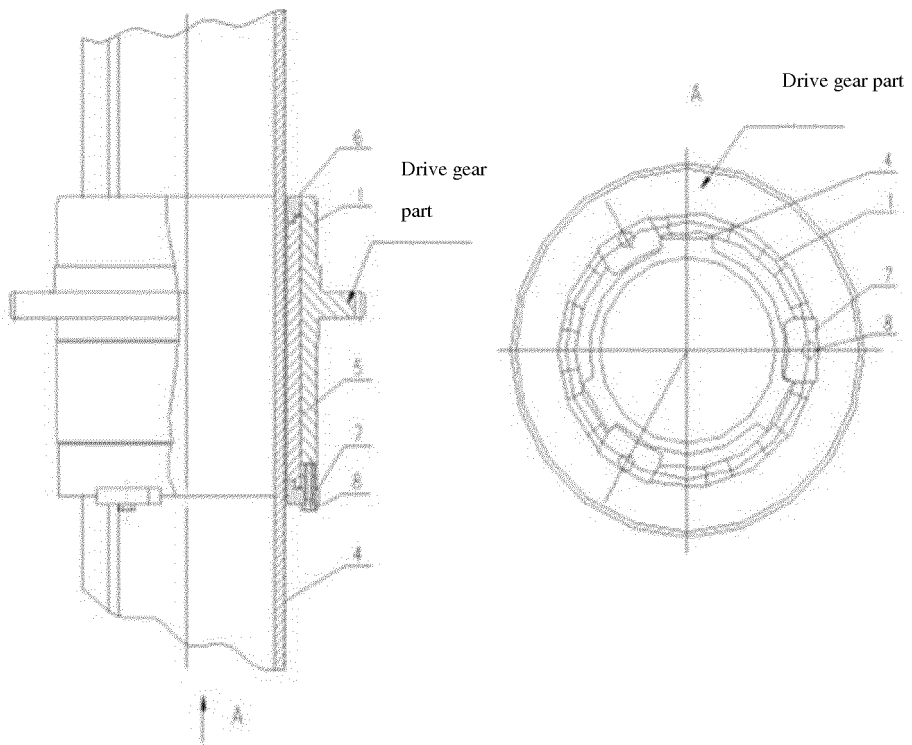
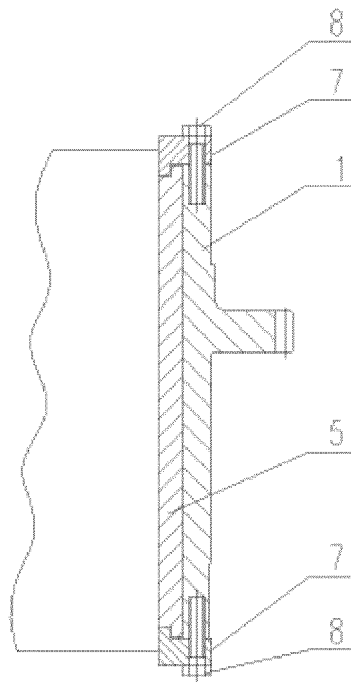
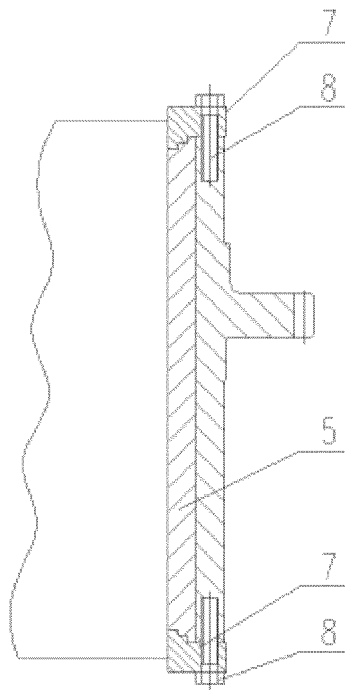


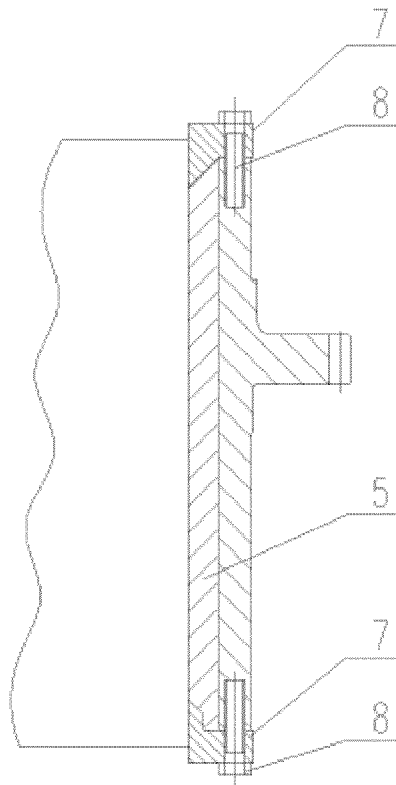
Fig. 2



**Fig. 3**



**Fig. 4**



**Fig. 5**

**REFERENCES CITED IN THE DESCRIPTION**

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