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(54) GLASS PLATE FOR CONCRETE CONVEYING PUMP

(57) Disclosed in the present invention is a glass plate for a concrete conveying pump which comprises a steel base(2) with two feeding through holes(1), the end face of the steel base(2) is embedded and welded with a wear-resistant material slide joint surface(3); shear rings(4) are assembled in the two feeding through holes (1) of the steel base(2), and are provided with openings; grooves(5) are formed on inner circular faces of the feeding through holes(1); and outer circular faces of the shear rings(4) are provided with flanges(6) matched with the grooves(5). By the structure, a flange ring at one end of each shear ring(4) and countersunk holes for accommodating the shear rings(4) on the steel base(2) are eliminated, and the interference of sealing grooves on the end face of the steel base(2) and the countersunk holes for accommodating the shear rings on the steel base(2) is avoided. Along the axis direction, a central parting plane of a shear ring(4) is taken as a symmetrical plane, the grooves(5) and the flanges(6) are symmetrical about the symmetrical plane, thus allowing the shear ring(4) to be utilized twice by the positive and negative surfaces.

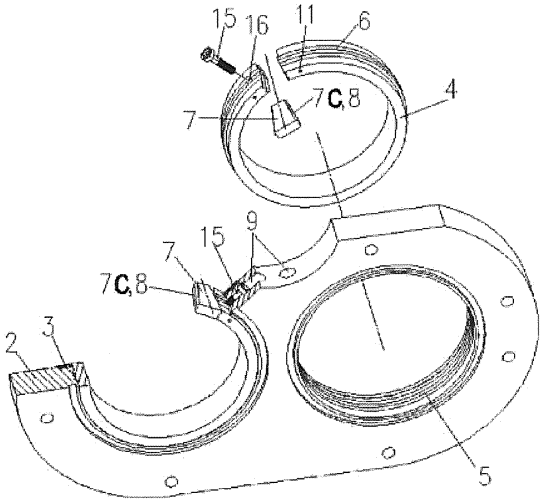

Fig. 3

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Description

Field of the Invention

[0001] The present invention relates to a glass plate for a concrete conveying pump.

Description of the Prior Art

[0002] Existing glass plates for concrete conveying pumps comprise a steel base with two feeding through holes thereon, the end face of the steel base is embedded and welded with a wear-resistant material slide joint surface, and shear rings are assembled in the two feeding through holes of the steel base. In the Chinese Patent Authorized Publication No. CN201582092 U, shear rings are assembled in two feeding through holes of the steel base, one end of each shear ring is provided with a flange ring that is accommodated in a countersunk hole of the steel base. During use, the flange ring is pressed tightly in the countersunk hole by the assembly pressure between the steel base and the external conveying pump such that the shear ring will not become loose or turn and fall off in operations. On some steel bases, however, interference could take place between the countersunk holes for accommodating the shear rings and sealing grooves on the end face thereof. Moreover, the assembly and disassembly thereof are relatively inconvenient. In addition, such a sear ring only has one face thereof utilized, which is a waste.

Summary of the Invention

[0003] The object of the present invention is to provide a glass plate for a concrete conveying pump, eliminate countersunk holes for accommodating the shear rings and a flange ring at one end of each shear ring, avoid the interference of sealing grooves on the end face of the steel base and the countersunk holes for accommodating the shear rings thereon, and achieve convenient assembly and disassembly.

[0004] To attain the above object, the glass plate for a concrete conveying pump according to the present invention comprises a steel base with two feeding through holes thereon, the end face of the steel base is embedded and welded with a wear-resistant material slide joint surface, shear rings are assembled in the two feeding through holes of the steel base, which are provided with openings, grooves are formed on inner circular faces of the feeding through holes, and outer circular faces of the shear rings are provided with flanges matched with the grooves.

[0005] With the structure according to the present invention, the flange ring on the shear ring is eliminated and the interference of sealing grooves on the end face of the steel base and the countersunk holes for accommodating the shear rings thereon is avoided, leading to convenient assembly and disassembly. At the same time, the engagement of the grooves and the flange can effectively prevent displacement of the shear ring along the axial direction of the feeding through hole.

[0006] Along the axial direction, a centrally dividing plane of the shear ring is taken as a symmetry plane, and the grooves and the flanges are symmetrically arranged with respect to the symmetry plane.

[0007] With such a structure, the front of shear ring can be reversed to become the back, which is re-assembled in the feeding through hole for use, i.e. two end faces of the shear ring can be utilized, which doubles the service life of the shear ring relative to the past.

[0008] In such a structure, the structure of grooves and flange is simple, which facilitates design, processing and production.

[0009] The groove comprises at least one groove arc segment in the circumferential direction, the flange matches the groove and comprises the same number of flange arc segments as that of the groove arc segments.

[0010] Such a structure replaces continuous grooves and flanges with discontinuous grooves and flanges, which can prevent the shear ring from turning circumferentially.

[0011] The cross-sectional shape of the grooves and flanges is rectangular, which can improve the precision of axial positioning of the shear ring.

[0012] An expansion device is provided at the opening of the shear ring.

[0013] When the shear ring is placed in the feeding through hole, the expansion of the expansion device increases the diameter of the shear ring such that the shear ring is more reliably pressed tight onto the inner wall of the feeding through hole, which ensures that the shear ring will not become loose during operations.

[0014] The expansion device is composed of two mutually matching expansion wedge blocks, and two side surfaces of the two expansion wedge blocks that match with the shear ring are both parallel to the axis of the shear ring.

[0015] With such a structure, when the shear ring is reversed and installed on the feeding through hole, the two expansion wedge blocks can still match with the opening of the shear ring such that the shear ring with the expansion device can also be used twice with its front and back.

[0016] The steel base is provided with radial holes that are open to the feeding through holes, a screw is provided within the radial hole, and a screw hole is formed on one of the expansion wedge blocks for threaded connection with the screw.

[0017] The above structure can ensure that the shear ring will not turn during operations and at the same time, is favorable for assembly and disassembly of the expansion wedge blocks.

[0018] The steel base is provided with a guide lifting groove that is open to the feeding through hole, and a guide ear that matches with the guide lifting groove is provided on one of the expansion wedge blocks.

[0019] During operations, the guide lifting groove can limit the circumferential position of the expansion wedge block by means of the guide ear therein, thereby ensuring that the shear ring will not turn during operations.

[0020] The steel base is provided with radial holes that are open to the feeding through holes, a screw is provided within the radial hole for fixing the shear ring, thereby ensuring that the shear ring will not turn during operations.

Brief Description of the Drawings

[0021]

Fig. 1 illustrates the 3-D structure of Example I of the present invention;

Fig. 2 illustrates the 3-D structure of the combination of a shear ring, an expansion wedge block and a screw in Example I;

Fig. 3 is an exploded local cross-sectional view of the 3-D structure of Example I;

Fig. 4 illustrates the 3-D structure of Example II;

Fig. 5 is an exploded local cross-sectional view of the 3-D structure of Example II;

Fig. 6 illustrates the 3-D structure of Example III;

Fig. 7 illustrates the 3-D structure of the combination of a shear ring, and big and small expansion wedge blocks in Example III;

Fig. 8 is an exploded local cross-sectional view of the 3-D structure of Example III;

Fig. 9 illustrates the 3-D structure of Example IV;

Fig. 10 is an exploded local cross-sectional view of the 3-D structure of Example IV;

Fig. 11 is an enlarged view of the shear ring part in Fig. 3;

Fig. 12 is an enlarged view of the steel base part in Fig. 3;

Fig. 13 is an enlarged view of the steel base part in Fig. 8;

Fig. 14 is an enlarged view of the base part in Fig. 10.

Detailed Description of Specific Embodiments

Example I

[0022] As shown in Fig. 1, Fig. 2, Fig. 3, Fig. 11 and Fig. 12, the glass plate for a concrete conveying pump according to the present invention comprises a steel base 2 with two feeding through holes 1 thereon, the end face of the steel base 2 is embedded and welded with a wear-resistant material slide joint surface 3, shear rings 4 are assembled in the two feeding through holes 1 of the steel base 2, the shear rings 4 are provided with openings, and an expansion device is provided at the opening of the shear ring 4. Grooves 5 are formed on inner circular faces of the feeding through holes 1, and outer circular faces of the shear rings 4 are provided with flanges 6 matched with the grooves 5.

[0023] Along the axial direction, a centrally dividing plane of the shear ring 4 is taken as a symmetry plane (the symmetry plane evenly divides the shear ring 4 into two parts with the thickness of each part being one half of the thickness of the entire shear ring 4), and the grooves 5 and the flanges 6 are symmetrically arranged with respect to the symmetry plane.

[0024] The cross-sectional shape of each of the grooves 5 and each of the flanges 6 is preferably mutually matching rectangle, or mutually matching triangle, trapezoid, semicircle, or other shapes.

[0025] The number of the grooves 5 and the flanges 6 each may be one, two, three or more.

[0026] All of the grooves 5 and the flanges 6 are continuous circumferentially.

[0027] The expansion device is composed of an expansion wedge block 7, and two inclined side surfaces 7C of the expansion wedge block 7 are provided with a V-shaped guide groove 8. The steel base 2 is provided with a radial hole 9 that is open to the feeding through hole 1, a screw 15 is provided within the radial hole 9, and one end of the shear ring 4 is formed with a screw hole 16 for threaded connection with the screw 15. Tightening holes 11 are formed at the openings of the two end faces of the shear ring 4 for using an internal caliper to assemble and disassemble.

[0028] Wherein, the inner holes and end faces of the shear ring 4 are coated with a wear-resistant material to improve the service life of the shear ring 4.

Example II

[0029] As shown in Fig. 4 and Fig. 5, this example is different from Example I in that the cross-sectional shape of the groove 5 and the flange 6 is rectangular and there are one groove 5 and one flange 6. The groove 5 comprises at least one groove arc segment in the circumferential direction, the flange 6 matches the groove 5 and comprises the same number of flange arc segments as that of the groove arc segments. The expansion device is composed of two mutually matching expansion wedge

blocks 7A and 7B, one big and one small, and two side surfaces 7C of the two expansion wedge blocks 7A and 7B that match with the shear ring 4 are both parallel to the axis of the shear ring 4. A V-shaped guide groove 8 is formed on the side surfaces 7C of the two expansion wedge blocks 7A and 7B and the side surfaces 4C of the openings of the shear ring 4 for mutual match. The big expansion wedge block 7A is provided with a flange 7D for matching with the groove 5. The small expansion wedge block 7B thereof is relatively long before the assembly, and the extra part is removed with a polishing machine after assembly, as shown in Fig. 5.

Example III

[0030] As shown in Fig. 6 to Fig. 8 and Fig. 13, this example is different from Example II in that there are two grooves 5 and two flanges 6, which are the first groove 5A, the second groove 5B, the first flange 6A and the second flange 6B, respectively. All of the grooves 5A, 5B and the flanges 6A, 6B are continuous circumferentially. The expansion device is composed of two expansion wedge blocks 7A and 7B, one big and one small, and two side surfaces 7C of the two expansion wedge blocks 7A and 7B that match with the shear ring 4 are both parallel to the axis of the shear ring 4. The steel base 2 is provided with a guide lifting groove 12 that is open to the feeding through hole 1, and the big expansion wedge block 7A thereof is provided with a guide ear 13 that matches with the guide lifting groove 12. A V-shaped positioning groove 14 is formed on the side surface 7C of the big expansion wedge block 7A that matches with the shear ring 4, the V-shaped positioning groove 14 may be formed only locally on the side surface 7C of the expansion wedge block 7A, or may be formed on the entire side surface 7C of the expansion wedge block 7A as shown in Fig. 8 to achieve the axial positioning of the expansion wedge block 7. The side surface 7C of the small expansion wedge block 7B that engages with the shear ring 4 is a plane with no groove.

[0031] During assembly, an internal caliper is inserted into the tightening hole 11 to clutch the shear ring 4 and place it into the feeding through hole 1 of the steel base 2. The expansion wedge block 7 that has the guide ear 13 is inserted into the guide lifting groove 12 of the steel base 2. The longer and small expansion wedge block 7B is pushed in and the extra part is removed with a polishing machine after assembly, as shown in Fig. 6 to Fig. 8.

Example IV

[0032] As shown in Fig. 9, Fig. 10 and Fig. 14, this example is different from Example III in that the cross-sectional shape of the groove 5 and the flange 6 is rectangular and there are one groove 5 and one flange 6. The side surfaces 7C of the two expansion wedge blocks 7A and 7B that match with the shear ring 4 are all planes with no groove and parallel to the axis of the shear ring 4. The side surfaces 4C of the openings of the shear ring 4 are all planes as well. The steel base 2 is provided with a radial hole 9 that is open to the feeding through hole 1, a screw 15 is provided within the radial hole 9, and the big expansion wedge block 7A is formed with a screw hole 16 for threaded connection with the screw 15. The big expansion wedge block 7A is provided with a flange 7D for matching with the groove 5.

[0033] During assembly, an internal caliper is inserted into the tightening hole 11 to clutch the shear ring 4 and place it into the feeding through hole 1 of the steel base 2. The screw 15 is installed in the radial hole 9 that is open to the feeding through hole 1 on the steel base 2 to fix the big expansion wedge block 7A. The longer and small expansion wedge block 7B is pushed in and the extra part is removed with a polishing machine after assembly, as shown in Fig. 9 and Fig. 10.

Claims

1. A glass plate for a concrete conveying pump, comprising a steel base with two feeding through holes thereon, the end face of the steel base is embedded and welded with a wear-resistant material slide joint surface, shear rings are assembled in the two feeding through holes of the steel base, which are provided with openings, **characterized in that** grooves are formed on inner circular faces of the feeding through holes, and outer circular faces of the shear rings are provided with flanges matched with the grooves.

2. The glass plate for a concrete conveying pump as set forth in Claim 1, **characterized in that** along the axial direction, a centrally dividing plane of the shear ring is taken as a symmetry plane, and the grooves and the flanges are symmetrically arranged with respect to the symmetry plane.

3. The glass plate for a concrete conveying pump as set forth in Claim 2, **characterized in that** all of the grooves and the flanges are continuous circumferentially.

4. The glass plate for a concrete conveying pump as set forth in Claim 2, **characterized in that** the groove comprises at least one groove arc segment in the circumferential direction, the flange matches the groove and comprises the same number of flange arc segments as that of the groove arc segments.

5. The glass plate for a concrete conveying pump as set forth in Claim 2, **characterized in that** the cross-sectional shape of the grooves and flanges is rectangular.

6. The glass plate for a concrete conveying pump as

set forth in any one of Claims 1 to 5, **characterized in that** an expansion device is provided at the opening of the shear ring.

7. The glass plate for a concrete conveying pump as set forth in Claim 6, **characterized in that** the expansion device is composed of two mutually matching expansion wedge blocks, and two side surfaces of the two expansion wedge blocks that match with the shear ring are both parallel to the axis of the shear ring.

8. The glass plate for a concrete conveying pump as set forth in Claim 7, **characterized in that** the steel base is provided with radial holes that are open to the feeding through holes, a screw is provided within the radial hole, and a screw hole is formed on one of the expansion wedge blocks for threaded connection with the screw.

9. The glass plate for a concrete conveying pump as set forth in Claim 7, **characterized in that** the steel base is provided with a guide lifting groove that is open to the feeding through hole, and a guide ear that matches with the guide lifting groove is provided on one of the expansion wedge blocks.

10. The glass plate for a concrete conveying pump as set forth in any one of Claims 1 to 5, **characterized in that** the steel base is provided with radial holes that are open to the feeding through holes, a screw is provided within the radial hole for fixing the shear ring.

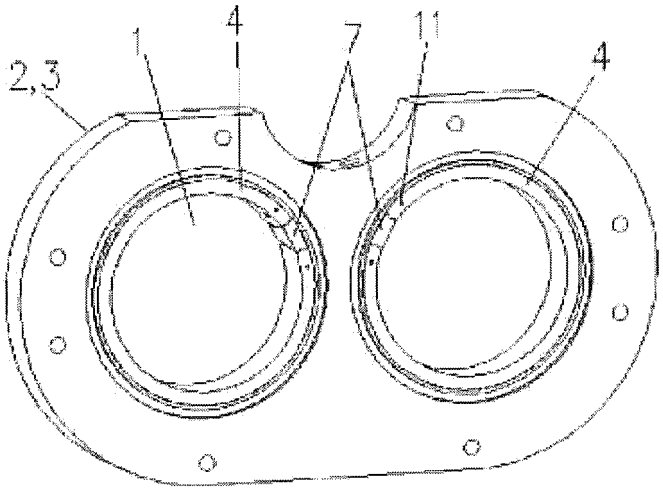

Fig. 1

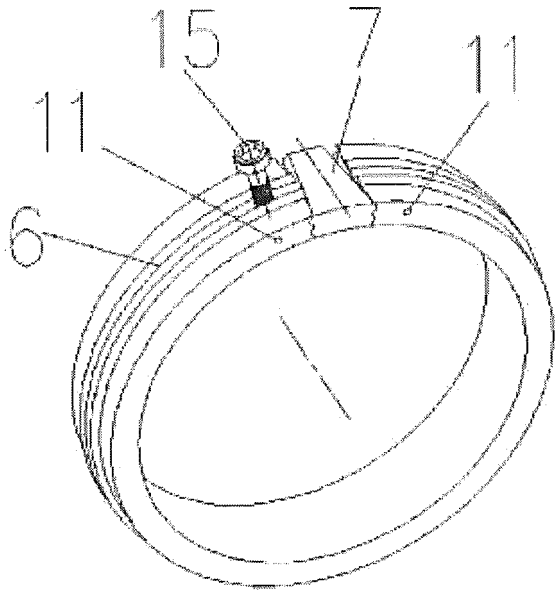

Fig. 2

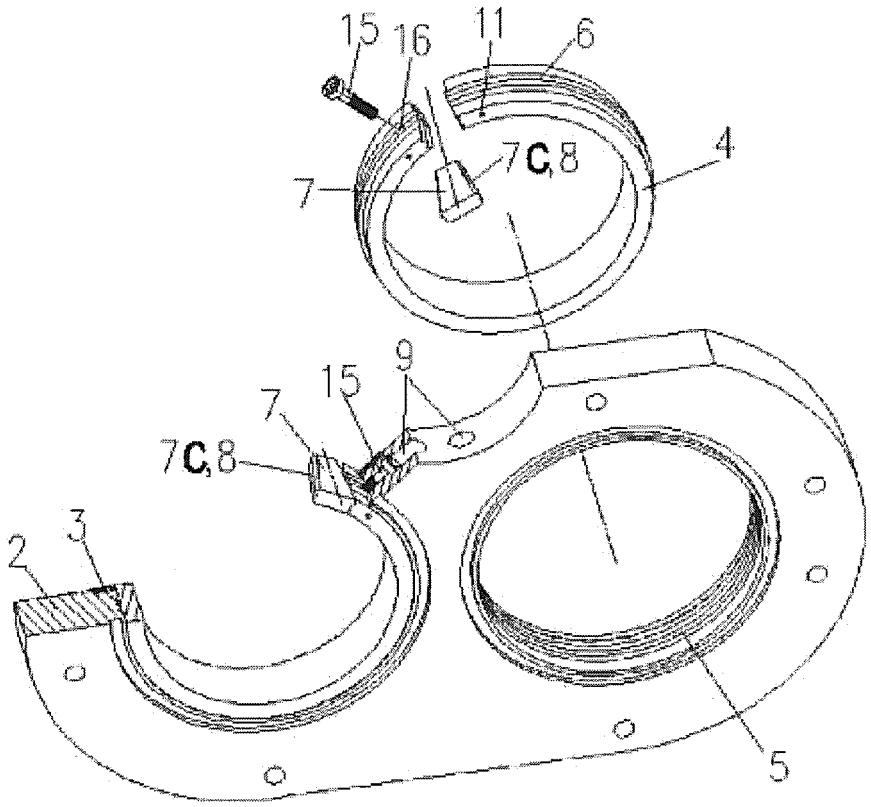

Fig. 3

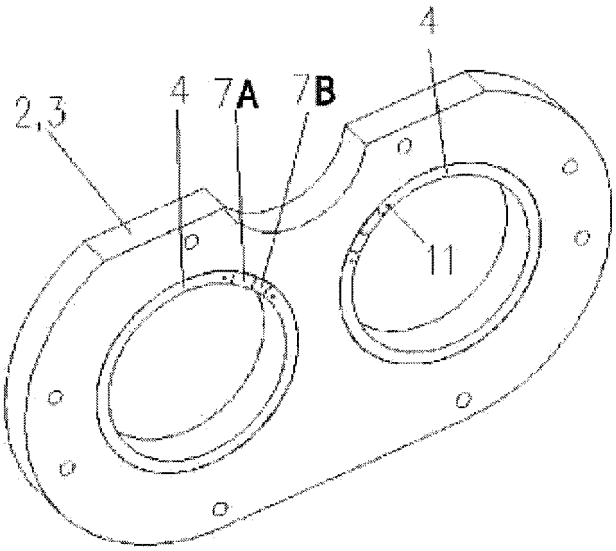

Fig. 4

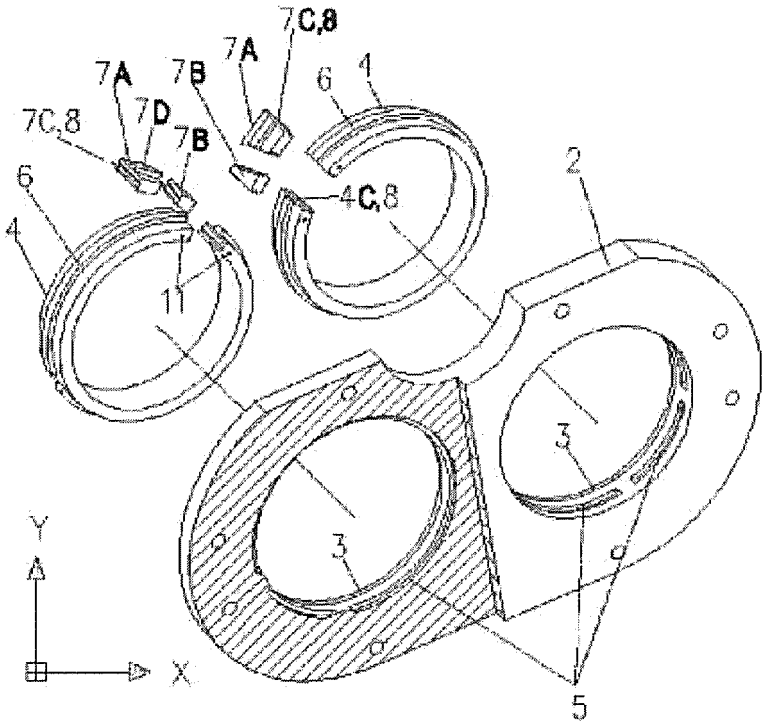

Fig. 5

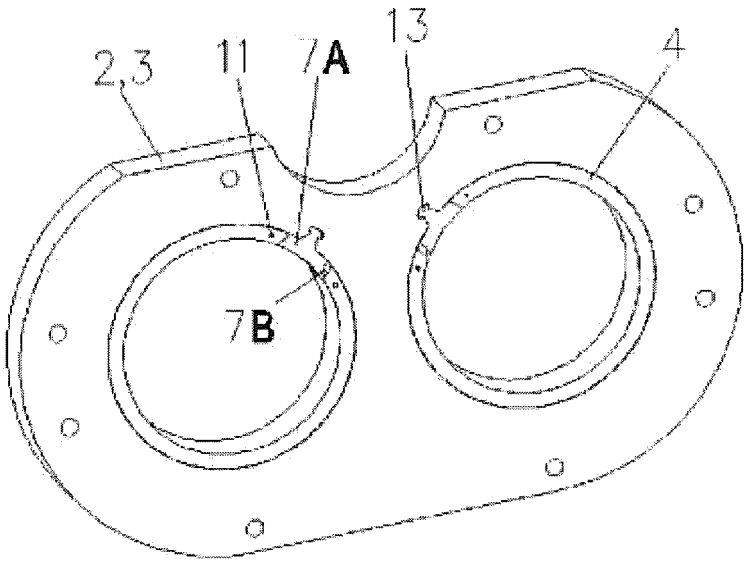

Fig. 6

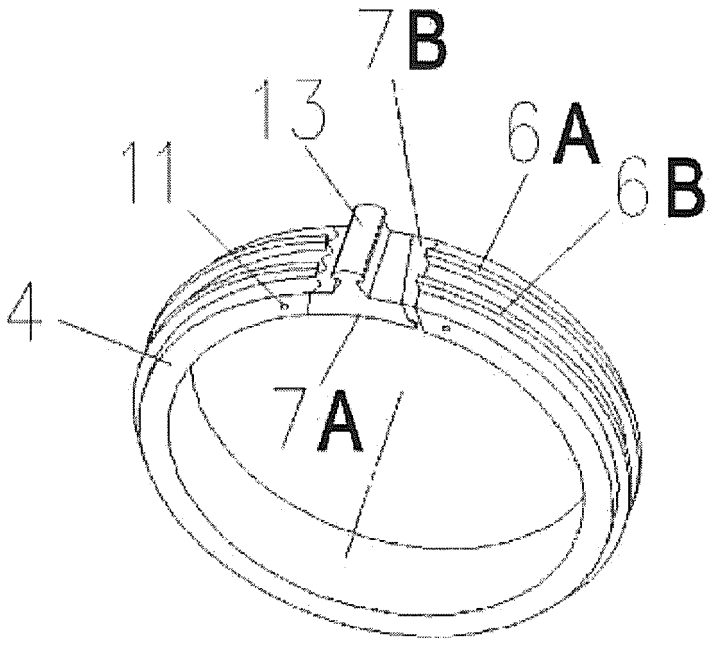

Fig. 7

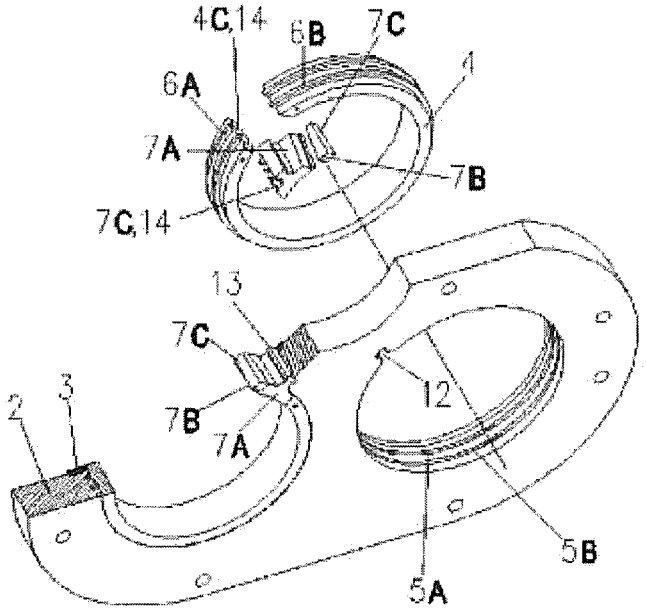

Fig. 8

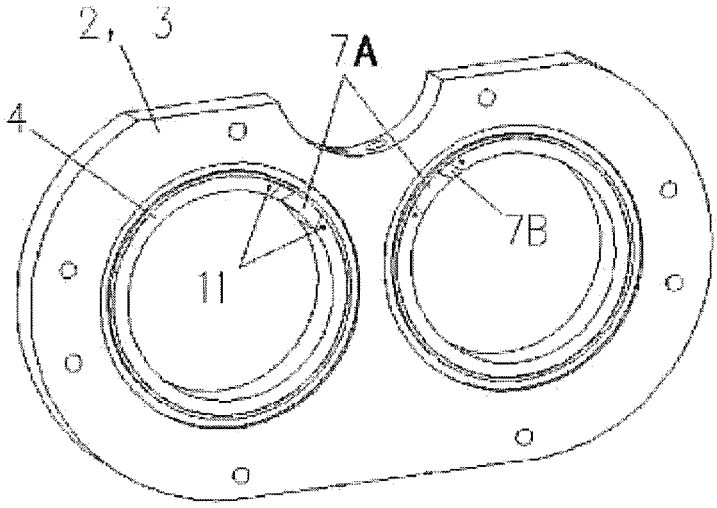

Fig. 9

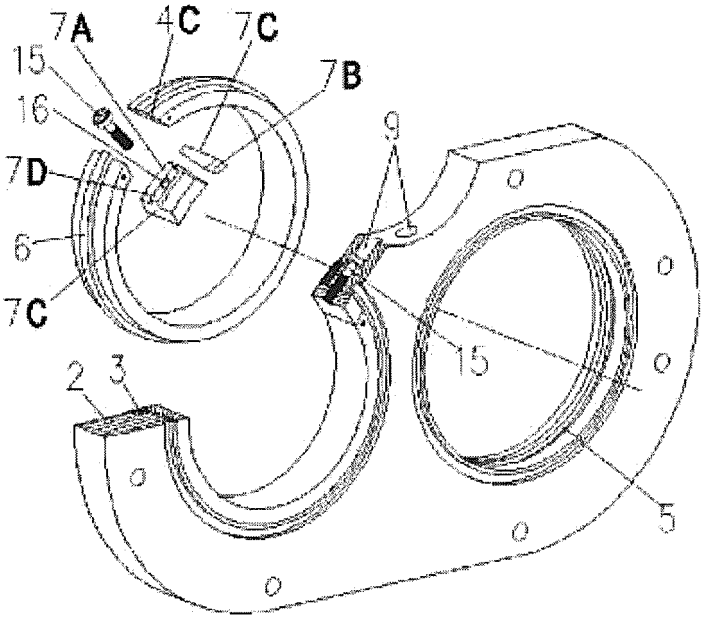

Fig. 10

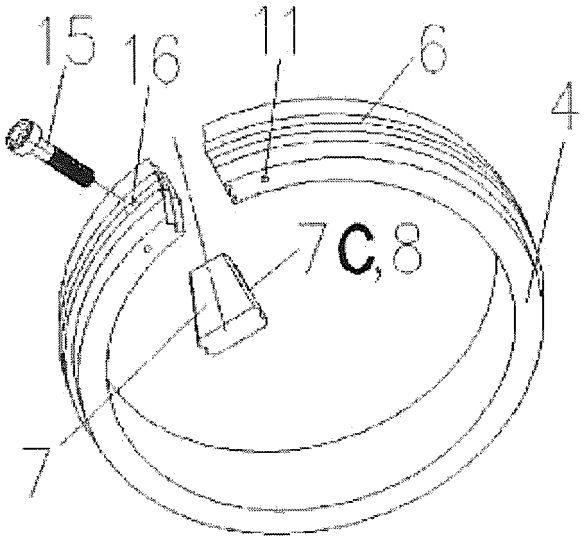

Fig. 11

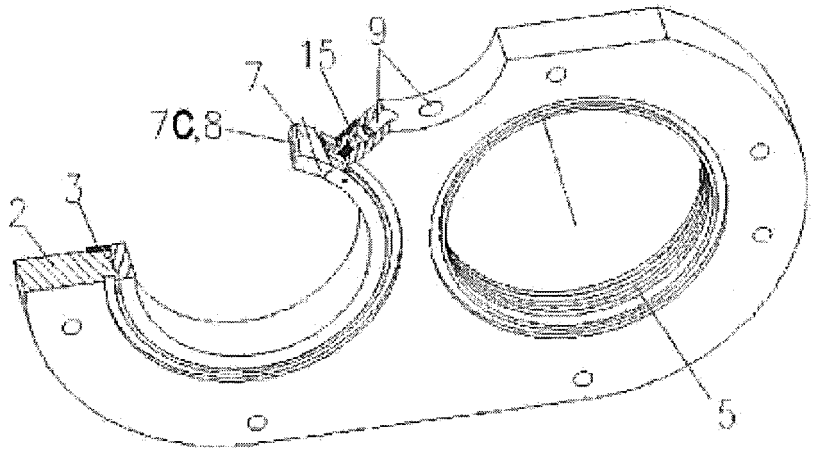

Fig. 12

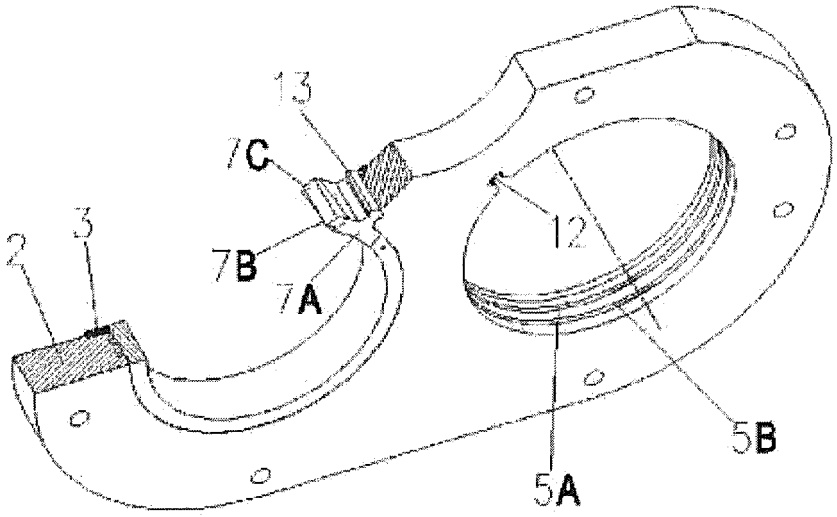

Fig. 13

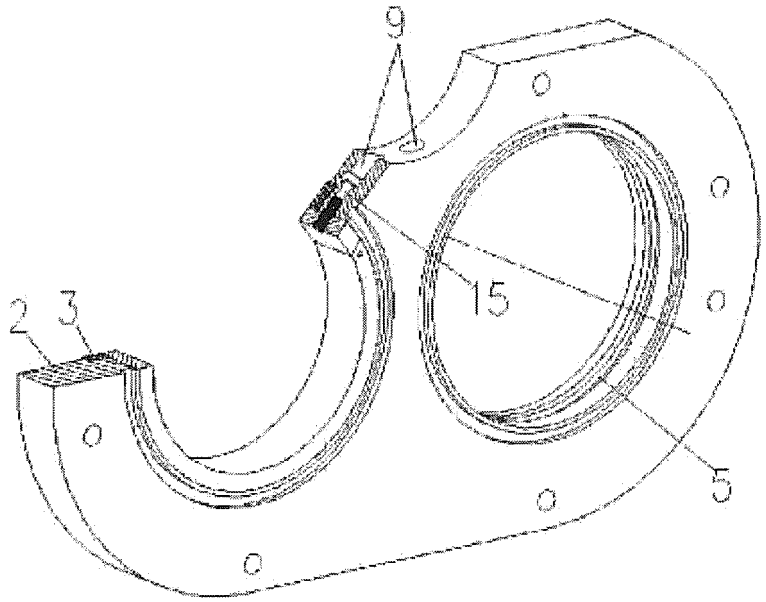

Fig. 14

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2012/080041

A. CLASSIFICATION OF SUBJECT MATTER

see the extra sheet

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)

IPC: F04B15/02; F04B15/-; F04B53/-; F04B

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)

CNPAT,CNKI,WPI,EPODOC

YIAN W MACHINERY, concrete+, pump?, eyeglass, eye+, glass+, spectacle?, ring?, annular+, circle, circul+, wear+, groove?, trough?, concave+, slot?

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 102297126 A (ZHENGZHOU YIAN MACHINERY CO.,LTD.) 28 Dec.2011(28.12.2011) the whole description	1-10
PX	CN 202187904 U (ZHENGZHOU YIAN MACHINERY CO.,LTD.) 11 Apr.2012(11.04.2012) the whole description	1-10
A	CN 102086858 A (ZHENGZHOU YIAN MACHINERY CO.,LTD.) 08 June 2011(08.06.2011) the whole description; figures 1-15	1-10
A	JP 1-267372 A (KAWASAKI HEAVY INDUSTRIES,LTD.) 25 Oct.1989(25.10.1989) the whole document	1-10
A	US 5857490 A (KAO, Chin Yen) 12 Jan.1999(12.01.1999) the whole document	1-10

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

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"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

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"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
22 October 2012 (22.10.2012)	29 November 2012 (29.11.2012)

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	ZHANG, Chen Telephone No. (86-10)62413231

Form PCT/ISA /210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2012/080041

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 1742159 A (HAN, Lacksu) 01 March 2006(01.03.2006) the whole document	1-10
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A	CN 2575325 Y (WENG, Zonggeng) 24 Sept.2003(24.09.2003) the whole document	1-10

Form PCT/ISA /210 (continuation of second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2012/080041

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CN 2575325 Y	24.09.2003	NONE	

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

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2012/080041

A. CLASSIFICATION OF SUBJECT MATTER:
F04B15/02（2006.01）i
F04B53/00（2006.01）n

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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