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PLUGGING DEVICE FOR BLOWHOLE AT CORNER OF TANK BOTTOM JOINT PIPE AND APPLICATION THEREOF

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(71) Applicant(s)
Yankuang Lunan Chemicals Co., Ltd.

(72) Inventor(s)
XIAO, Yaomeng;BAO, Leilei;LI, Zhiyuan;XU, Kaifeng;WU, Xiaoping;CHEN, Ming;ZHANG, Haiyong;ZHU, Jian;ZHAO, Peng;QIAO, Haojie;LI, Chengyu;SHAO, Yue

(74) Agent / Attorney
Collison & Co, Gpo Box 2556, Adelaide, SA, 5001, AU

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(71) 申请人: 兖矿鲁南化工有限公司 (YANKUANG LUNAN CHEMICALS CO., LTD.) [CN/CN]; 中国山东省枣庄市滕州市木石镇, Shandong 277527 (CN)。

(72) 发明人: 包磊磊 (BAO, Leilei); 中国山东省枣庄市滕州市木石镇, Shandong 277527 (CN)。 李志远 (LI, Zhiyuan); 中国山东省枣庄市滕州市木石镇, Shandong 277527 (CN)。 徐开峰 (XU, Kaifeng); 中国山东省枣庄市滕州市木石镇, Shandong 277527 (CN)。 吴晓苹 (WU, Xiaoping); 中国山东省枣庄市滕州市木石镇, Shandong 277527 (CN)。 陈明 (CHEN, Ming); 中国山东省枣庄市滕州市木石镇, Shandong 277527 (CN)。 张海勇 (ZHANG, Haiyong); 中国山东省枣庄市滕州市木石镇, Shandong 277527 (CN)。 朱健 (ZHU, Jian); 中国山东省枣庄市滕州市木石镇, Shandong 277527 (CN)。 赵鹏 (ZHAO, Peng); 中国山东省枣庄市滕州市木石镇, Shandong 277527 (CN)。 乔豪杰 (QIAO, Haojie); 中国山东省枣庄市滕州市木石镇, Shandong 277527 (CN)。 李成宇 (LI, Chengyu); 中国山东省枣庄市滕州市木石镇, Shandong 277527 (CN)。 邵悦 (SHAO, Yue); 中国山东省枣庄市滕州市木石镇, Shandong 277527 (CN)。

(74) 代理人: 济南圣达知识产权代理有限公司 (JINAN SHENGDA INTELLECTUAL PROPERTY AGENCY CO.,LTD.); 中国山东省济南市经十路17703号华特广场B308室, Shandong 250061 (CN)。

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(54) **Title:** LEAK STOPPING DEVICE FOR SAND HOLE AT TANK BOTTOM CONNECTING PIPE CORNER AND APPLICATION THEREOF

(54) 发明名称: 一种罐底接管角处砂眼堵漏装置及其应用

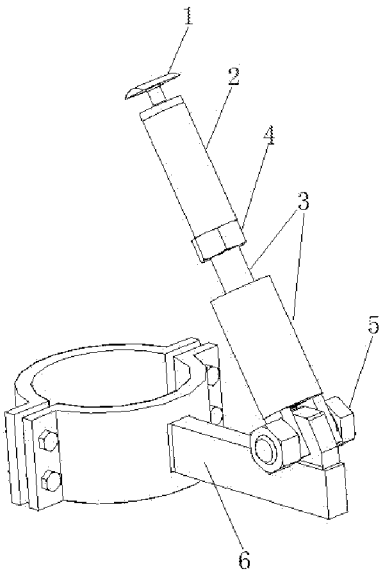

图 2

(57) **Abstract:** A leak stopping device for a sand hole at a tank bottom connecting pipe corner, comprising: a sealing gasket (1), a connecting pipe (2), an ejector rod (3), an ejector rod nut (4), an ejector rod fixing device (5), and a clamp assembly (6). The ejector rod (3) is of a rod-shaped structure, and the outer surface thereof is provided with a thread. The ejector rod nut (4) is screwed onto the ejector rod (3) by means of the thread. One end of the ejector rod (3) extends into one end of the connecting pipe (2) so that the connecting pipe (2) is sleeved on the ejector rod (3), and the connecting pipe (2) can freely move on the ejector rod (3). The sealing gasket (1) is provided on the other end of the connecting pipe (2). The other end of the ejector rod (3) can cooperate with the ejector rod fixing device (5) so as to fix the ejection rod (3) to the clamp assembly (6). The clamp assembly (6) can be fixed to a tank bottom connecting pipe. By designing a special tool outside a leak point of a fillet weld sand hole to exert external force, the purpose of online leak stoppage is achieved, and the problem in the existing leak stopping device of inability to stop the leak for the sand hole formed in the tank bottom connecting pipe corner is well solved.

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— 包括国际检索报告(条约第21条(3))。

(57) 摘要：一种罐底接管角处砂眼堵漏装置，包括：密封垫（1），连接管（2），顶杆（3），顶杆螺母（4），顶杆固定装置（5）和卡箍组件（6），顶杆（3）为杆状结构，其外表面上设置有螺纹，顶杆螺母（4）通过螺纹旋在顶杆（3）上，顶杆（3）的一端伸入连接管（2）的一端后使连接管（2）套在顶杆（3）上，且连接管（2）能够在顶杆（3）上自由运动，密封垫（1）设置在连接管（2）的另一端；顶杆（3）的另一端能够和顶杆固定装置（5）配合，进而将顶杆（3）固定在卡箍组件（6）上，卡箍组件（6）上能够固定在罐底接管上。在角焊缝砂眼泄漏点外侧，设计专用工具施加外力，达到在线堵漏的目的，很好地解决了现有的堵漏装置无法对罐底接管角处出现的砂眼进行堵漏的问题。

PLUGGING DEVICE FOR BLOWHOLE AT CORNER OF TANK BOTTOM JOINT PIPE AND APPLICATION THEREOF

TECHNICAL FIELD

The present invention relates to the field of plugging devices for a blowhole in a pipeline, and specifically, to a plugging device for a blowhole at a corner of a tank bottom joint pipe and an application thereof.

BACKGROUND

Information of the background in the present invention is merely disclosed to increase the understanding of the overall background of the present invention, but is not necessarily regarded as acknowledging or suggesting, in any form, that the information constitutes the prior art known to a person of ordinary skill in the art.

In chemical production, a blowhole in a production device usually causes medium leakage. Therefore, people design a plurality of tools to facilitate the plugging of blowholes. For example, Patent No. 201620735275.4 discloses a jacking-type plugging device for a blowhole in a pipeline. In the device, an adjustable steel band is used to rapidly position a jacking bolt above a leaking point of a pipeline, a plane bearing is used to implement nut rotation, and a jacking force is applied to a gasket between a blowhole and a bolt in a relatively static manner of the bolt, thereby implementing temporary plugging of the blowhole. In another example, Patent No. 201721270950.1 provides a bridge-type magnetic attraction plugging device for a blowhole in a pipeline, including a connecting rod, two connecting rod joints, and a compression bolt. The two connecting rod joints are disposed symmetrically at two ends of the connecting rod. Lower ends of the connecting rod joints are connected to magnets. The connecting rod is provided with a bolt hole. The compression bolt passes through the bolt hole and compresses the gasket at a position of a blowhole. It is convenient to mount the device, and a blowhole can be plugged quickly, so that the efficiency is relatively high.

However, the inventor finds that because a corner of a tank bottom joint pipe is usually formed after welding, blowholes are more likely to appear at corners of tank bottom joint pipes of a tower, a groove, a tank, and the like. Existing plugging devices are not applicable to blowholes at these positions. Therefore, when blowholes appear at these positions, a production line needs to be stopped for repair. As a result, the production cycle of products is delayed, and there are also a series of problems such as the transport and storage of production materials,

causing considerable inconvenience to production. That is, some existing plugging devices cannot perform online plugging on blowholes that appear at corners of tank bottom joint pipes of a tower, a groove, a tank, and the like in an online chemical system.

SUMMARY

For the foregoing problems, the present invention is to provide a plugging device for a blowhole at a corner of a tank bottom joint pipe and an application thereof. In the present invention, a special-purpose tool is designed to apply an external force to the outside of a leakage point of a fillet weld blowhole for online plugging, thereby adequately resolving shortcomings of an existing plugging device.

A first objective of the present invention is to provide a plugging device for a blowhole at a corner of a tank bottom joint pipe.

A second objective of the present invention is to provide an application of a plugging device for a blowhole at a corner of a tank bottom joint pipe.

To achieve the foregoing objectives, the present invention discloses the following technical solutions:

First, the present invention discloses a plugging device for a blowhole at a corner of a tank bottom joint pipe, including: a gasket, a connecting pipe, a jacking rod, a jacking rod nut, a jacking rod fixing device, and a clamp assembly, where

the jacking rod is a rod-shaped structure, an outer surface of the jacking rod is provided with threads, the jacking rod nut is screwed on the jacking rod through the threads, one end of the jacking rod extends into one end of the connecting pipe to enable the connecting pipe to be sleeved on the jacking rod, the connecting pipe is freely movable on the jacking rod, and the gasket is disposed at the other end of the connecting pipe; and the other end of the jacking rod is capable of fitting the jacking rod fixing device to fix the jacking rod on the clamp assembly, and the clamp assembly is capable of being fixed on a tank bottom joint pipe to provide a supporting force for plugging of a blowhole.

As a further technical solution, the gasket is detachably disposed on the connecting pipe, so that the gasket is replaced as required. For example, the gasket is replaced according to a size of the blowhole.

As a further technical solution, the gasket is a thimble, and an area of the thimble is greater than an area of the blowhole, so as to implement plugging of the blowhole.

As a further technical solution, the thimble includes a sealing end and a fixing end, and the

sealing end is pluggable in a port of the connecting pipe, so that the thimble is detachably disposed in the connecting pipe.

As a further technical solution, the jacking rod is detachably fixed on the clamp assembly by the jacking rod fixing device, so that blowholes at different positions are plugged by adjusting a degree of deviation of the jacking rod relative to the clamp assembly.

As a further technical solution, the jacking rod fixing device includes a first bolt and a first nut, both the other end of the jacking rod and the clamp assembly are provided with first screw holes, and the first bolt passes through the first screw holes and then detachably fixes the jacking rod on the clamp assembly through the first nut.

As a further technical solution, the clamp assembly includes: a support portion, a first clamp sleeve, and a second clamp sleeve, both the first clamp sleeve and the second clamp sleeve are arc-shaped structures and are combined to form a ring-shaped clamp, one end of the support portion is fixedly connected to one of the clamp sleeves, and a first screw hole is provided in the support portion. Such a clamp assembly can be quickly fixed on a tank bottom joint pipe, thereby reducing a time required for online plugging and minimizing leakage.

As a further technical solution, the first clamp sleeve and the second clamp sleeve are combined and then detachably fixed together by a second bolt and a second nut, and both the first clamp sleeve and the second clamp sleeve are provided with second screw holes for the second bolt to pass through.

Finally, the present invention discloses an application of the plugging device for a blowhole at a corner of a tank bottom joint pipe in the chemical field.

One of features of the plugging device for a blowhole at a corner of a tank bottom joint pipe in the present invention is as follows: When a blowhole appears at a corner of a tank bottom joint pipe and causes leakage of a reaction tank, because a ring-shaped clamp is formed by two sets of separable clamp sleeves, during use, the tank bottom joint pipe is clamped between a first clamp sleeve and a second clamp sleeve, and the first clamp sleeve and the second clamp sleeve are fixed together, so that the plugging device of the present invention is quickly fixed at an appropriate position on the tank bottom joint pipe, and a degree of deviation of a jacking rod relative to a clamp assembly is adjusted by a jacking rod fixing device, thereby aligning an end of the jacking rod provided with a gasket with the blowhole to complete a stage of accurately finding a position. Subsequently, a jacking rod nut is rotated, movement of a connecting pipe is controlled through movement of the jacking rod nut on the jacking rod, to adjust the gasket on the connecting pipe to the blowhole. Further, through transmission by the jacking rod nut, the gasket keeps applying an external force to the blowhole. A leaking sealant

closely adheres to a surface of the blowhole under a pressure of the gasket to form a sealing layer. The external force keeps increasing until leak is stopped at a leakage point, thereby implementing online plugging. The clamp assembly fixed on the tank bottom joint pipe provides a stable and sufficient supporting force for the entire plugging device with the help of the tank bottom joint pipe. Therefore, non-stop online plugging is implemented, and a plugging effect is stable and lasting.

A second feature of the plugging device for a blowhole at a corner of a tank bottom joint pipe in the present invention is as follows: Such a plugging device is specially designed for blowholes that appear at a corner of a tank bottom joint pipe. Due to a special position of the corner of the tank bottom joint pipe, a common plugging device is completely inapplicable, and it is impossible to plug blowholes at these positions. However, the present invention provides a precondition for plugging the blowholes at these positions by skillfully using the tank bottom joint pipe and using the clamp assembly and the jacking rod with an adjustable degree of deviation relative to the clamp assembly, and then the connecting pipe is adjusted by the jacking rod nut to implement extension or retraction of the connecting pipe relative to the jacking rod, so that the gasket is adjusted to the blowhole for plugging.

Compared with the prior art, the present invention has the following beneficial effects:

(1) In the present invention, a special-purpose tool is designed to apply an external force (a plugging glue may be used in combination) to the outside of a leakage point of a fillet weld blowhole for online plugging, thereby adequately resolving a problem that an existing plugging device cannot plug a blowhole at a corner of a tank bottom joint pipe.

(2) The plugging device in the present invention is applicable for an initial stage of leakage of low-pressure containers and has an adequate effect, thereby effectively reducing the occurrence of environmental protection accidents and safety accidents. In particular, in a case that the pipeline and the tank bottom are eccentric, the plugging device of the present invention can also effectively implement plugging, and has strong adaptability to working conditions.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings constituting a part of the present invention are used for providing further understanding for the present invention. Exemplary embodiments of the present invention and descriptions thereof are used for explaining the present invention and do not constitute any inappropriate limitation to the present invention.

FIG. 1 is a structural exploded view of a plugging device for a blowhole at a corner of a

tank bottom joint pipe according to Embodiment 1 of the present invention.

FIG. 2 is an assembly diagram of a plugging device for a blowhole at a corner of a tank bottom joint pipe according to Embodiment 1 of the present invention.

FIG. 3 is a schematic structural diagram of a connecting pipe according to Embodiment 1 of the present invention.

FIG. 4 is a structural exploded view of a plugging device for a blowhole at a corner of a tank bottom joint pipe according to Embodiment 2 of the present invention.

FIG. 5 is a schematic structural diagram of a jacking rod according to Embodiment 3 of the present invention.

FIG. 6 is a schematic structural diagram of a clamp assembly according to Embodiment 3 of the present invention.

FIG. 7 is a schematic structural diagram of a plugging device for a blowhole at a corner of a tank bottom joint pipe according to Embodiment 3 of the present invention.

FIG. 8 is a schematic exploded view of a plugging device for a blowhole at a corner of a tank bottom joint pipe according to Embodiment 4 of the present invention.

FIG. 9 is a schematic structural diagram of a clamp assembly according to Embodiment 4 of the present invention.

FIG. 10 is a schematic structural diagram of a thimble according to Embodiment 5 of the present invention.

FIG. 11 is a schematic diagram of a use state of a plugging device for a blowhole at a corner of a tank bottom joint pipe according to Embodiment 6 of the present invention.

Reference numerals respectively represent: 1-gasket, 2-connecting pipe, 3-jacking rod, 4-jacking rod nut, 5-jacking rod fixing device, 6-clamp assembly, 7-tank bottom, 8-tank bottom joint pipe, 5.1-first bolt, 5.2-first nut, 5.3-first screw hole, 6.1-support portion, 6.2-first clamp sleeve, 6.3-second clamp sleeve, 6.4-second bolt, 6.5-second nut, 6.6-second screw hole.

DETAILED DESCRIPTION

It should be pointed out that the following detailed descriptions are all illustrative and are intended to provide further descriptions of the present invention. Unless otherwise specified, all technical and scientific terms used herein have the same meanings as those usually understood by a person of ordinary skill in the art to which the present invention belongs.

It should be noted that the terms used herein are merely used for describing specific implementations, and are not intended to limit exemplary implementations of the present

invention. As used herein, the singular form is also intended to include the plural form unless the context clearly dictates otherwise. In addition, it should further be understood that, terms "comprise" and/or "include" used in this specification indicate that there are features, steps, operations, devices, components, and/or combinations thereof.

As described in the related art, some existing plugging devices cannot perform online plugging on blowholes that appear at corners of tank bottom joint pipes of a tower, a groove, a tank, and the like in an online chemical system. Therefore, the present invention provides a plugging device for a blowhole at a corner of a tank bottom joint pipe. The present invention is further described with reference to the accompanying drawings and the specific implementations.

Embodiment 1

A plugging device for a blowhole at a corner of a tank bottom joint pipe includes a gasket 1, a connecting pipe 2, a jacking rod 3, a jacking rod nut 4, a jacking rod fixing device 5, and a clamp assembly 6.

The jacking rod 3 is a rod-shaped structure. An outer surface of the jacking rod is provided with threads. The jacking rod nut 4 is screwed on the jacking rod through the threads. One end of the jacking rod 3 extends into one end of the connecting pipe 2 to enable the connecting pipe to be sleeved on the jacking rod 3. The connecting pipe 2 is freely movable on the jacking rod 3. The gasket 1 is disposed at the other end of the connecting pipe 2. The other end of the jacking rod 3 is capable of fitting the jacking rod fixing device 5 to fix the jacking rod 3 on the clamp assembly 6. The clamp assembly 6 is capable of being fixed on a tank bottom joint pipe to provide a supporting force for plugging of a blowhole.

Embodiment 2

A plugging device for a blowhole at a corner of a tank bottom joint pipe is similar to Embodiment 1, and a difference lies in that referring to FIG. 4 and FIG. 5, the jacking rod fixing device 5 includes a first bolt 5.1 and a first nut 5.2. Both the other end of the jacking rod 3 and the clamp assembly 6 are provided with first screw holes 5.3. The first bolt 5.1 passes through the first screw holes 5.3 and then detachably fixes the jacking rod 3 on the clamp assembly 6 through the first nut 5.2. In this way, blowholes at different positions can be plugged by adjusting a degree of deviation of the jacking rod 3 relative to the clamp assembly 6.

Embodiment 3

A plugging device for a blowhole at a corner of a tank bottom joint pipe is similar to Embodiment 1, and a difference lies in that referring to FIG. 6 and FIG. 7, the clamp assembly 6 includes a support portion 6.1, a first clamp sleeve 6.2, and a second clamp sleeve 6.3. Both

the first clamp sleeve 6.2 and the second clamp sleeve 6.3 are arc-shaped structures and are combined to form a ring-shaped clamp. One end of the support portion 6.1 is fixedly connected to the first clamp sleeve 6.2. The first screw hole 5.3 is provided in the support portion 6.1. Such a clamp assembly can be quickly fixed on a tank bottom joint pipe, thereby reducing a time required for online plugging and minimizing leakage.

Embodiment 4

A plugging device for a blowhole at a corner of a tank bottom joint pipe is similar to Embodiment 3, and a difference lies in that referring to FIG. 8 and FIG. 9, the first clamp sleeve 6.2 and the second clamp sleeve 6.3 are combined and then detachably fixed together by a second bolt 6.4 and a second nut 6.5. Both the first clamp sleeve 6.2 and the second clamp sleeve 6.3 are provided with second screw holes 6.6 for the second bolt 6.4 to pass through.

Embodiment 5

A plugging device for a blowhole at a corner of a tank bottom joint pipe is similar to Embodiment 1, and a difference lies in that referring to FIG. 10, the gasket 1 is a thimble. The thimble includes a sealing end 1.1 and a fixing end 1.2. The sealing end 1.1 is disposed on the fixing end 1.2, and the fixing end 1.2 of the thimble is plugged in a port of the connecting pipe 2, so that the thimble is detachably disposed in the connecting pipe 2, and an area of the sealing end 1.1 is greater than an area of the blowhole.

Embodiment 6

A basic use principle of the plugging device for a blowhole at a corner of a tank bottom joint pipe in Embodiment 1 is as follows: Referring to FIG. 11, when a blowhole appears at a corner of a tank bottom joint pipe 8 and causes leakage of a tank bottom 7. Because a ring-shaped clamp is formed by two sets of separable clamp sleeves, during use, the tank bottom joint pipe 8 is clamped between the first clamp sleeve 6.2 and the second clamp sleeve 6.3, and the first clamp sleeve and the second clamp sleeve are fixed together, so that the plugging device described in Embodiment 1 is quickly fixed at an appropriate position on the tank bottom joint pipe 8, and the degree of deviation of the jacking rod 3 relative to the clamp assembly 6 is adjusted by the jacking rod fixing device 5, thereby aligning an end of the jacking rod 3 provided with a gasket with the blowhole to complete a stage of accurately finding a position. Subsequently, the jacking rod nut 4 is rotated, movement of the connecting pipe 2 is controlled by movement of the jacking rod nut 4 on the jacking rod 3, to adjust the gasket 1 on the connecting pipe 2 to the blowhole. Further, through transmission by the jacking rod nut 4, the gasket 1 keeps applying an external force to the blowhole. A leaking sealant closely adheres to a surface of the blowhole under a pressure of the gasket 1 to form a sealing layer. The external

force keeps increasing until leak is stopped at a leakage point, thereby implementing online plugging. The clamp assembly 6 fixed on the tank bottom joint pipe 8 provides a stable and sufficient supporting force for the entire plugging device with the help of the tank bottom joint pipe 8. Therefore, non-stop online plugging is implemented, and a plugging effect is stable and lasting.

The above descriptions are merely preferred embodiments of the present invention and are not intended to limit the present invention. A person skilled in the art may make various alterations and variations to the present invention. Any modification, equivalent replacement, or improvement made within the spirit and principle of the present invention shall fall within the protection scope of the present invention.

CLAIMS

What is claimed is:

1. A plugging device for a blowhole at a corner of a tank bottom joint pipe, comprising: a gasket, a connecting pipe, a jacking rod, a jacking rod nut, a jacking rod fixing device, and a clamp assembly, wherein

the jacking rod is a rod-shaped structure, an outer surface of the jacking rod is provided with threads, the jacking rod nut is screwed on the jacking rod through the threads, one end of the jacking rod extends into one end of the connecting pipe to enable the connecting pipe to be sleeved on the jacking rod, the connecting pipe is freely movable on the jacking rod, and the gasket is disposed at the other end of the connecting pipe; and the other end of the jacking rod is capable of fitting the jacking rod fixing device to fix the jacking rod on the clamp assembly, and the clamp assembly is capable of being fixed on a tank bottom joint pipe to provide a supporting force for plugging of a blowhole;

wherein the gasket is detachably disposed on the connecting pipe; and

wherein the gasket is a thimble, and an area of the thimble is greater than an area of the blowhole.

2. The plugging device for a blowhole at a corner of a tank bottom joint pipe according to claim 1, wherein the thimble comprises a sealing end and a fixing end, and the sealing end is pluggable in a port of the connecting pipe.

3. The plugging device for a blowhole at a corner of a tank bottom joint pipe according to any one of claims 1 to 2, wherein the jacking rod is detachably fixed on the clamp assembly by the jacking rod fixing device.

4. The plugging device for a blowhole at a corner of a tank bottom joint pipe according to claim 3, wherein the jacking rod fixing device comprises a first bolt and a first nut, both the other end of the jacking rod and the clamp assembly are provided with first screw holes, and the first bolt passes through the first screw holes and then detachably fixes the jacking rod on the clamp assembly through the first nut.

5. The plugging device for a blowhole at a corner of a tank bottom joint pipe according to any one of claims 1 to 3, wherein the clamp assembly comprises: a support portion, a first clamp sleeve, and a second clamp sleeve, both the first clamp sleeve and the second clamp sleeve are arc-shaped structures and are combined to form a ring-shaped clamp, one end of the support portion is fixedly connected to one of the clamp sleeves, and a first screw hole is provided in the support portion.

6. The plugging device for a blowhole at a corner of a tank bottom joint pipe according to claim 5, wherein the first clamp sleeve and the second clamp sleeve are combined and then detachably fixed together by a second bolt and a second nut, and both the first clamp sleeve and the second clamp sleeve are provided with second screw holes for the second bolt to pass through.

7. The plugging device for a blowhole at a corner of a tank bottom joint pipe according to any one of claims 1 to 6, wherein the device is applicable to the chemical field.

DRAWINGS

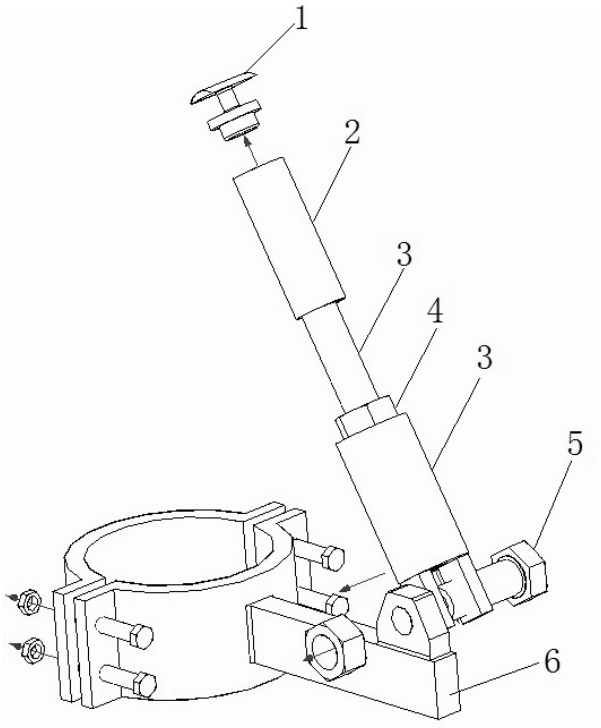

FIG. 1

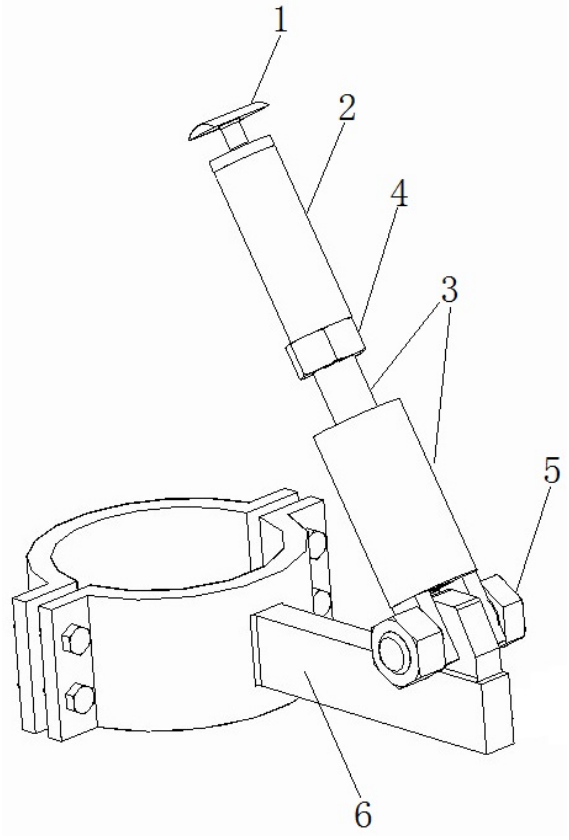

FIG. 2

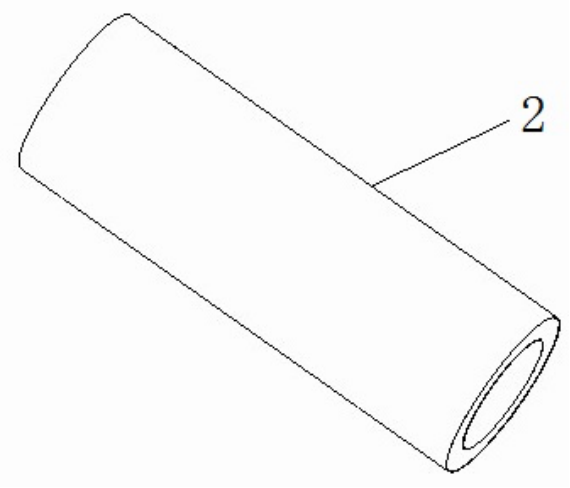

FIG. 3

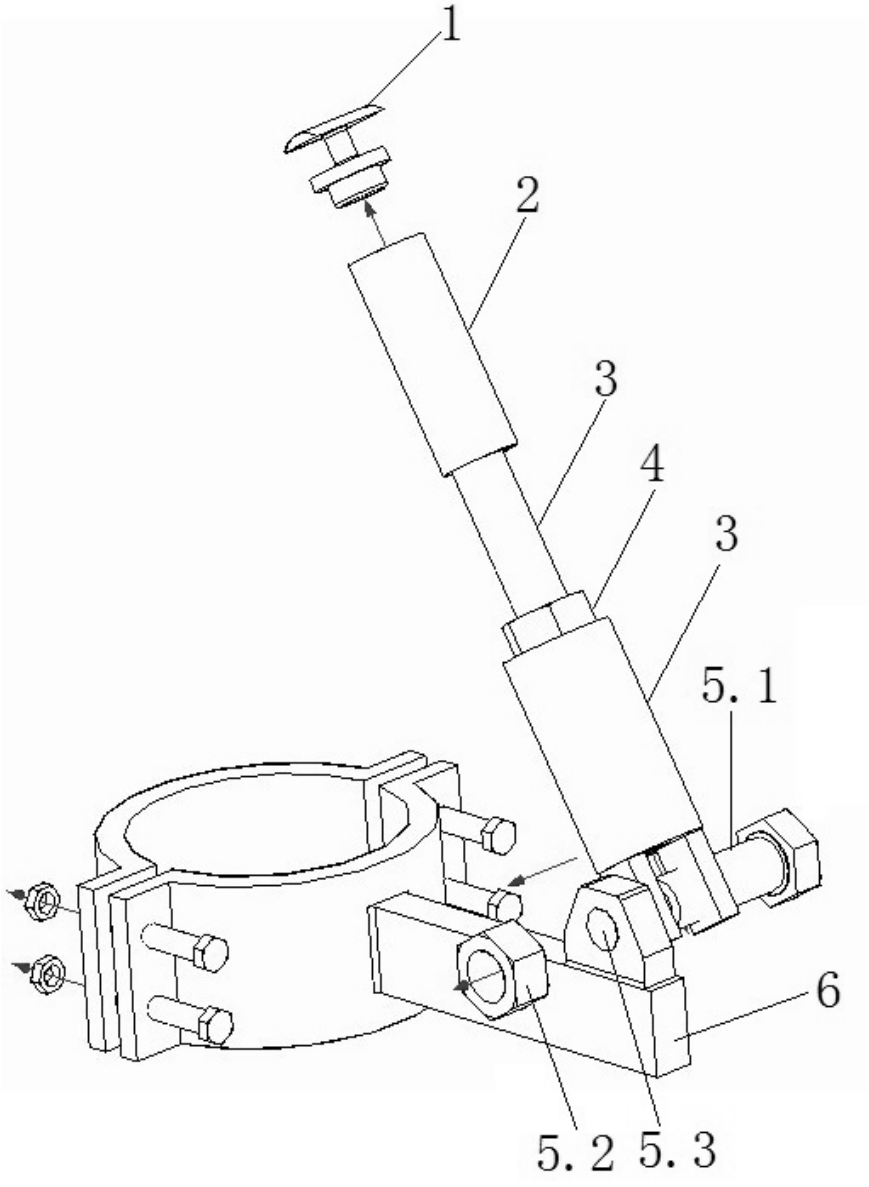

FIG. 4

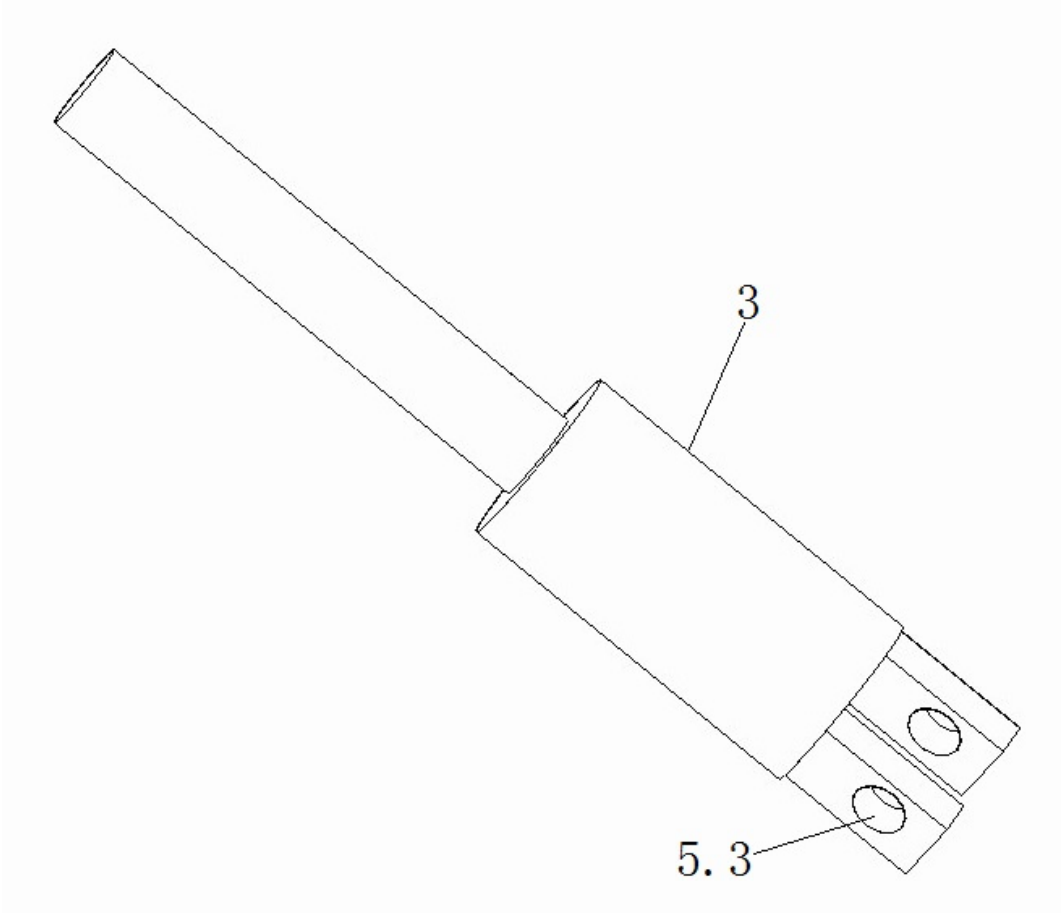

FIG. 5

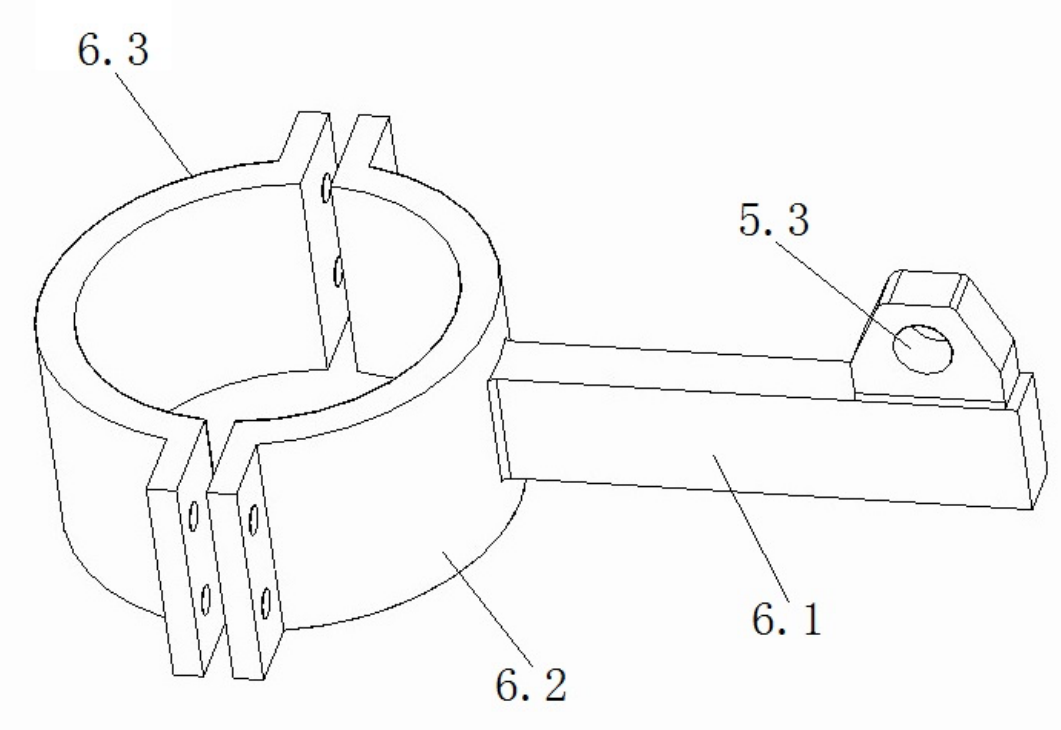

FIG. 6

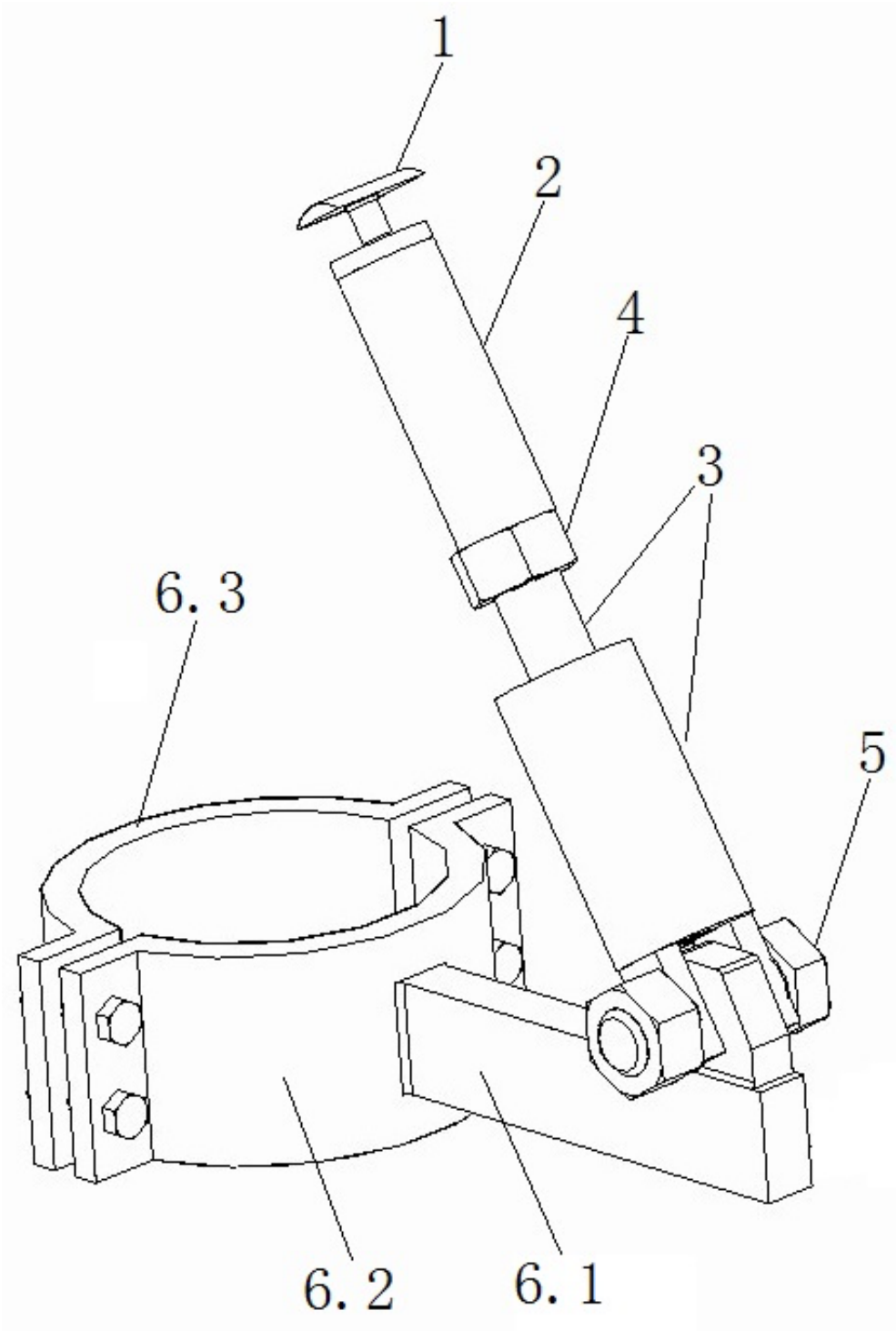

FIG. 7

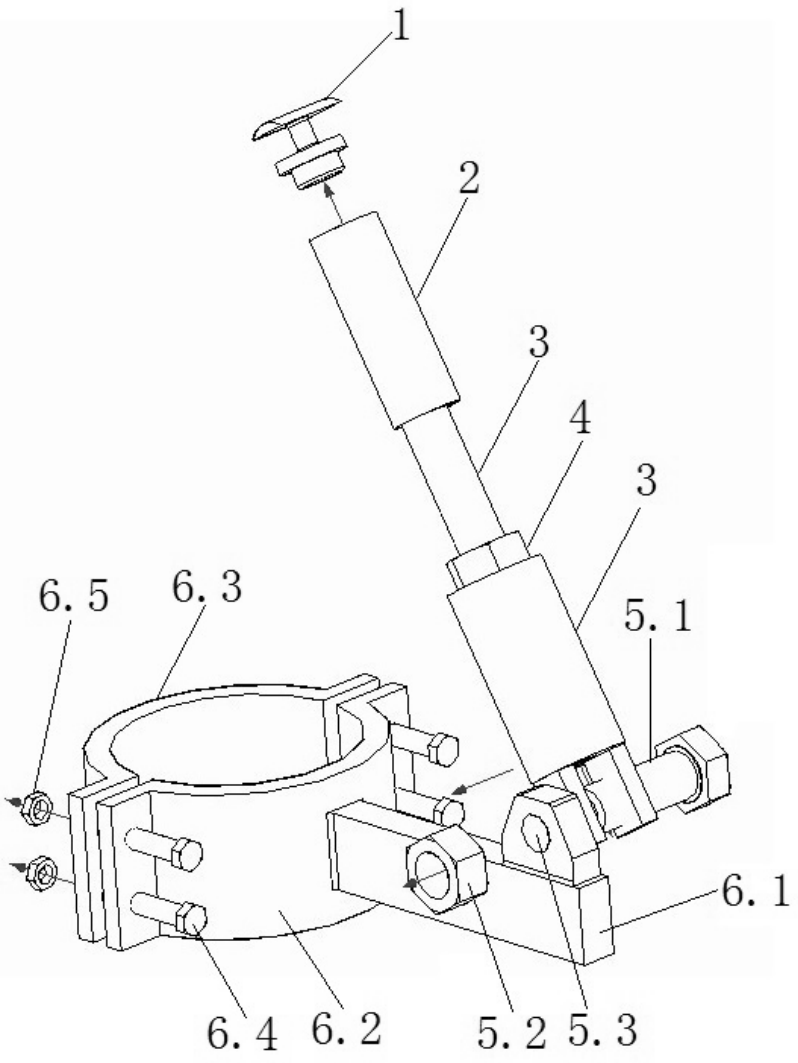

FIG. 8

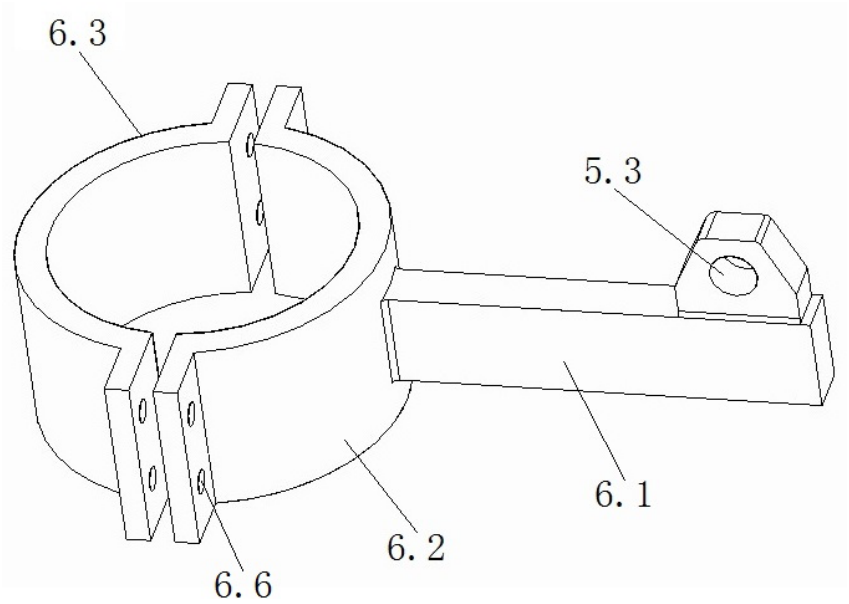

FIG. 9

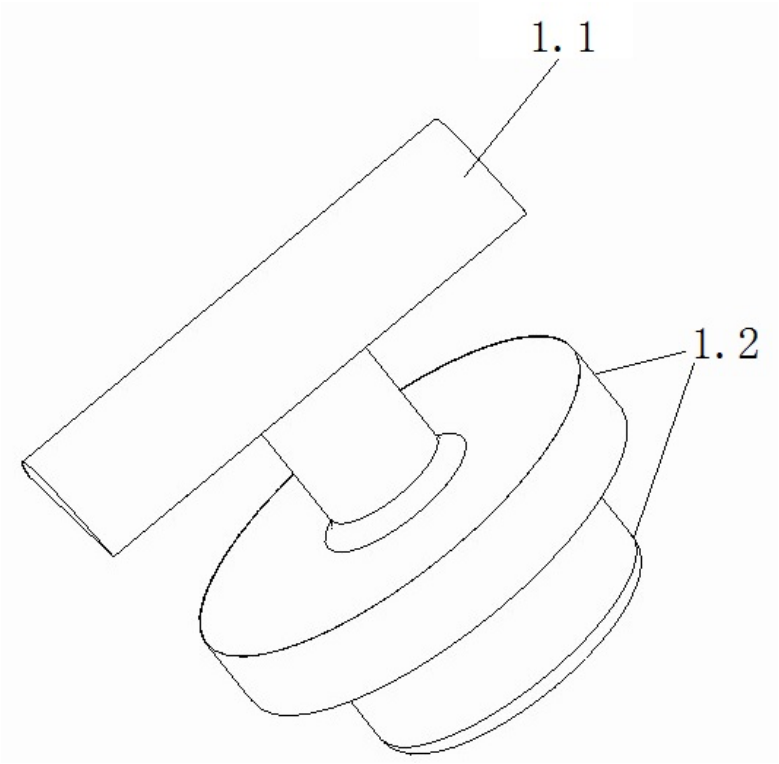

FIG. 10

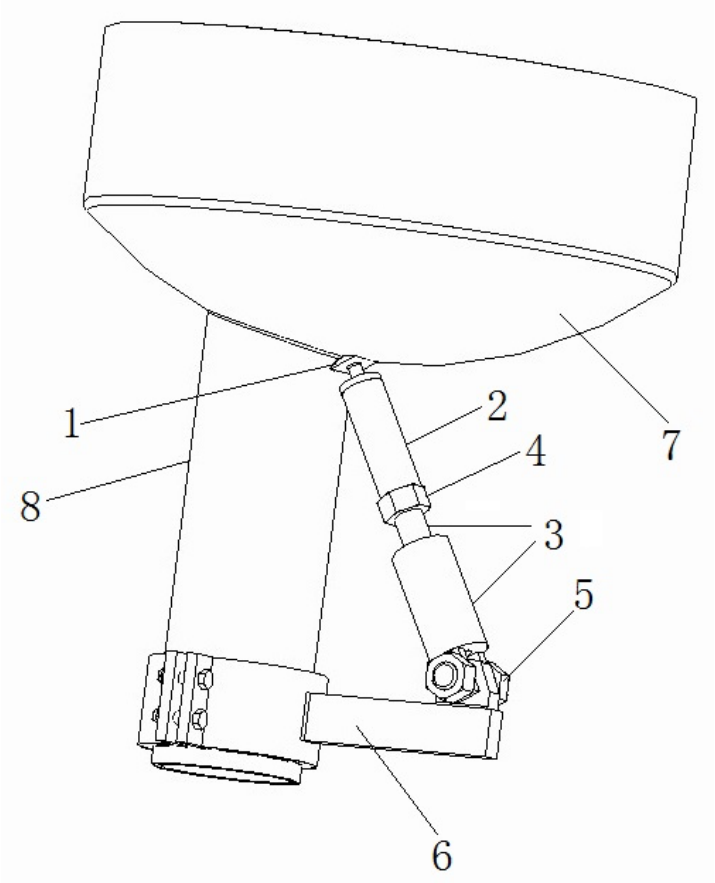

FIG. 11