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HYDRAULIC CONVERSION PLATFORM AND CONTROL METHOD THEREOF

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ABSTRACT

The disclosure relates to conversion devices for coupling of an attachment to an excavator, and more particularly to a hydraulic conversion platform and a control method thereof. The hydraulic conversion platform includes a hydraulic integrated switching part and a connecting part. The hydraulic integrated switching part is provided with a female quick plug-in connector and a female electrical connector. The connecting part is provided with a male quick plug-in connector and a male electrical connector. The female quick plug-in connector is matched with the male quick plug-in connector, and the female electrical connector is matched with the male electrical connector. The application also provides a control method of the hydraulic conversion platform. This application not only reduces the time and labor consumption and improves the operation efficiency in the replacement process, but also reduces the failure rate and simplifies the arrangement of pipelines. Through the hydraulic conversion platform, the replacement of the attachment and connection of pipelines can be completed within 2-4 s without manual operations.

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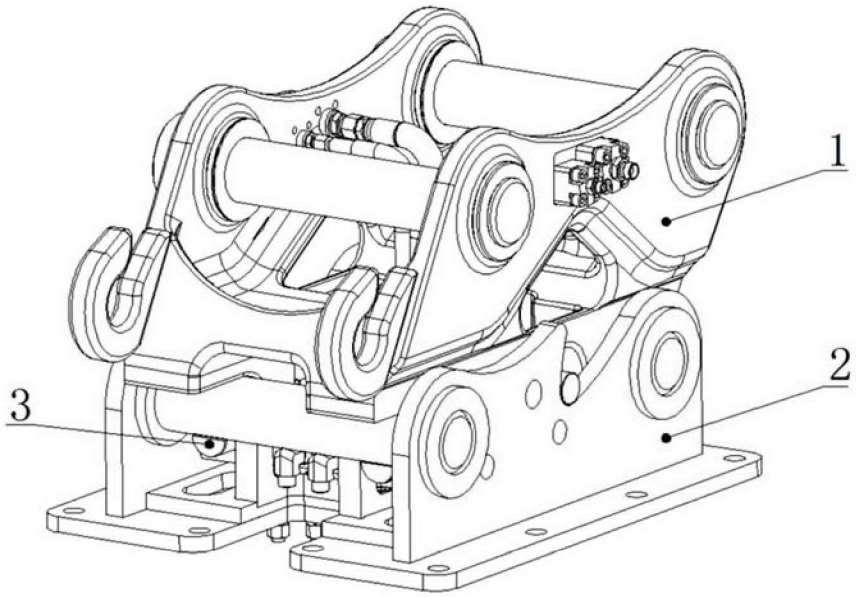

FIG. 1

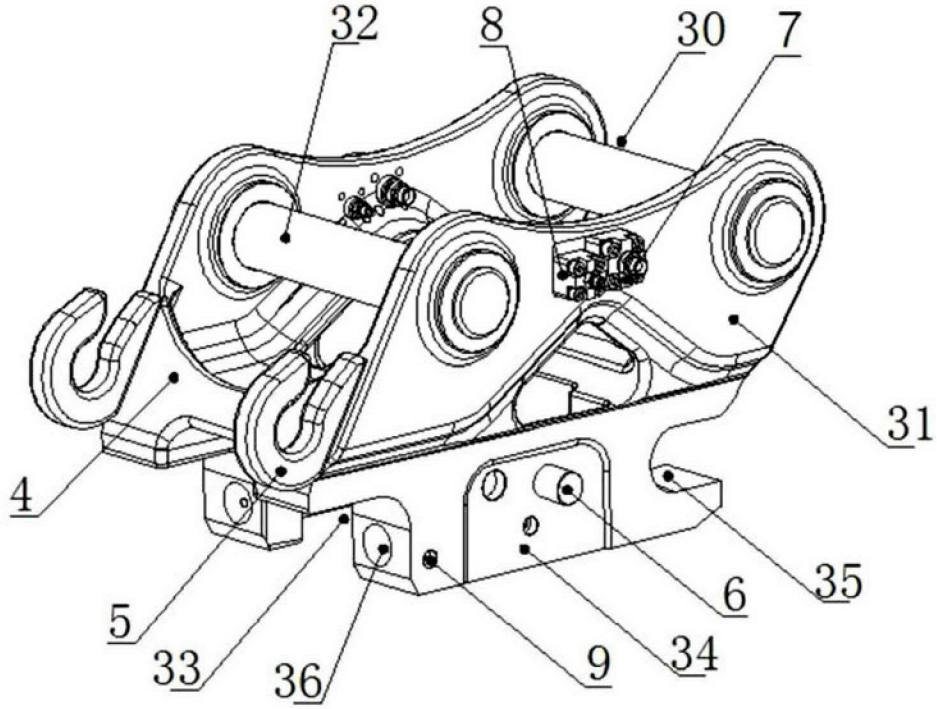

FIG. 2

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HYDRAULIC CONVERSION PLATFORM AND CONTROL METHOD THEREOF

TECHNICAL FIELD

This application relates to a conversion device for connection of an excavator main body and an attachment, and more particularly to a hydraulic conversion platform and a control method thereof.

BACKGROUND

In the practical engineering, it is often required to replace the attachment (such as breaking hammer, a plum blossom-like bucket and a hydraulic shear) of an excavator to meet the needs under different working conditions. In the traditional replacement of an attachment, hinge pins connected to the attachment on a bucket arm and a rocker of the excavator are directly detached, and then reinstalled after the desired attachment is attached. Unfortunately, such replacement method is time- and labor-consuming since it requires the cooperation of multiple operators. In addition, dust pollution often occurs at the engineering site, so that the small particles are prone to entering the hinging site between the attachment and the excavator during the traditional replacement, which will result in poor lubrication, thereby shortening the service life of the machine. Therefore, the traditional method is not suitable for frequent replacement of the attachments of medium and large excavators.

Interestingly, by arranging a quick coupling device between the attachment and the main machine, the replacement of the attachment can be completed in a shortened period of time. The quick coupling device, also called a conversion platform, is a connecting device provided between the bucket arm and the rocker of the excavator, which facilitates the attachment and detachment of attachments with different

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functions, rendering the excavator multi-functional. Currently, the quick coupling devices are dominated by manual and semi-automatic quick coupling devices, which cannot realize automatic connection of oil passages. Therefore, there is an urgent need to design a new universal conversion platform and a mechano-electron-hydraulic integrated control system to accelerate the coupling between the attachment and the main machine and reduce the switching time.

SUMMARY

In view of the above problems in the existing conversion platform for excavators, an object of the present disclosure is to provide a hydraulic conversion platform and a control method thereof.

Technical solutions of the present disclosure are described as follows.

In a first aspect, this application provides a hydraulic conversion platform, comprising:

a hydraulic integrated switching part; and

a connecting part;

wherein the hydraulic integrated switching part is provided with a female quick plug-in connector and a female electrical connector; the connecting part is provided with a male quick plug-in connector and a male electrical connector; the female quick plug-in connector is matched with the male quick plug-in connector; and the female electrical connector is matched with the male electrical connector;

the hydraulic integrated switching part further comprises a locking assembly; the locking assembly comprises two cylinders mounted on both sides of the locking assembly and a mounting plate provided between the two cylinders; the mounting plate is provided with a check valve mounting hole, four oil holes connected with the

two cylinders, an oil inlet, an oil return hole, a female electrical connector mounting hole and a female quick plug-in connector mounting hole; the oil inlet, the oil return hole and the four oil holes connecting with the two cylinders are communicated through an oil passage; a pilot-operated check valve is provided at the check valve mounting hole; the four oil holes connecting with the two cylinders are connected to the two cylinders through a pipeline; each of the two cylinders is connected to two oil holes with one for oil discharge and the other tone for oil return; two ends of each of the two cylinders are provided with a locking pin and an end cover, respectively; the locking pin comprises a pin base that is matched with the locking assembly and a pin rod; the pin rod is provided with a flat opening; a piston rod is provided in each of the two cylinders; an end of the piston rod extends out of the end cover; oil feed and discharge of a rod cavity and a rodless cavity of the hydraulic integrated switching part are controlled to enable connection of oil passages and electric circuits and mechanical locking; a limit block is fixedly provided on the end of the piston rod extending out of the end cover through a limit pin and a snap spring; and the female quick plug-in connector and the female electrical connector are mounted on the locking assembly, and coupling ends of the female quick plug-in connector and the female electrical connector are both provided on a side of the locking pin.

In some embodiments, the mounting plate is also movably inserted with a first positioning pin and a plate-opening pin; the first positioning pin is a plate-type pin; a dust cover plate is hinged with the mounting plate; the plate-opening pin is configured to open the dust cover plate and position the locking assembly; when the hydraulic conversion platform is coupled with an attachment, the piston rod is returned and an end of the plate-opening pin extends out of the mounting plate to lift the dust cover plate; the dust cover plate is configured to cover the female quick plug-in connector and the female electrical connector; the first positioning pin is sleeved with a spring; the first positioning pin is configured to support the hydraulic integrated switching part to ensure a tight connection.

In some embodiments, the spring is a compression spring, and the spring is provided between the locking assembly and a quick coupling main body. Specially, the compression spring can provide a greater instantaneous thrust for the locking assembly to quickly complete the connection of the oil passages and the electric circuits, ensuring the connection stability.

In an embodiment, the hydraulic integrated switching part is fixedly mounted on a main body.

In an embodiment, the main body comprises the quick coupling main body; the quick coupling main body comprises a lower coupling base and an upper connecting portion; the upper connecting portion comprises a pair of upper connecting side plates; a pair of housing pins is provided on the pair of upper connecting side plates; at least one of the pair of upper connecting side plates is provided with a transition joint A and/or a transition joint B; an end of each of the pair of upper connecting side plates is provided with a hook; the lower coupling base comprises a pair of lower connecting side plates; a rear part of each of the pair of lower connecting side plates is provided with a clamping groove; a front part of each of the pair of lower connecting side plates is provided with a pin-fastening orifice plate; a gap is provided between the pin-fastening orifice plates; the hydraulic integrated switching part is provided between the pair of lower connecting side plates; and the locking pin extends out of a round orifice on the corresponding pin-fastening orifice plate.

In an embodiment, each of the pair of lower connecting side plates is provided with a second positioning pin.

In an embodiment, the connecting part further comprises a connecting base; the connecting base comprises a connecting base plate and a pair of connecting lug plates provided thereon; each of the pair of connecting lug plates is provided with a connecting hook; two welding pins are mounted in parallel between the pair of connecting lug plates; a connector fixing plate is provided on the connecting base

plate and is provided between the two welding pins; a middle of the connector fixing plate is provided with the male quick plug-in connector and the male electrical connector; and a side of the connector fixing plate coupled with the female quick plug-in connector is provided with a third positioning pin for coupling. The connector fixing plate is a plate with holes in the middle for the mounting of the male quick plug-in connector and the male electrical connector.

In a second aspect, this application further provides a control method of the above hydraulic conversion platform, comprising:

connecting a main body of the hydraulic conversion platform to an arm and a connecting rod of an excavator through housing pins; and mounting a connecting base of a connecting part on an attachment;

allowing the main body of the hydraulic conversion platform to get close to the connecting part; allowing clamping grooves of a pair of lower connecting side plates to clamp a welding pin of the connecting base; adjusting an angle of the arm of the excavator to keep a bottom of the main body level with the connecting base; and driving a piston rod of a hydraulic integrated switching part to stretch out and draw back by hydraulic oil to lock a structure and achieve connections of oil passages and electric circuits at the same time.

In an embodiment, an attachment process of the attachment to the excavator is performed through steps of:

feeding, by a main pump, hydraulic oil into a rodless cavity of a cylinder of the hydraulic integrated switching part through a pilot-operated check valve;

pushing the piston rod to move from a high-pressure cavity to a low-pressure cavity by the hydraulic oil to stretch the piston rod out;

pushing a locking pin and a locking assembly of the hydraulic integrated switching part forward at the same time, wherein the locking pin moves forward to

lock the welding pin of the connecting base to complete a mechanical coupling, and the locking assembly moves forward to couple with a connector fixing plate of the connecting base, thereby achieving connection of oil passages and electric circuits; and

at the same time, returning the hydraulic oil in a rod cavity of the cylinder to an oil tank to complete an integrated switching of mechanics, electronics and hydraulics.

In the process, if an interruption suddenly occurs to the hydraulic oil, the locking pin is still in a locking state to maintain the connection of the oil passages and the electric circuits since the pilot-operated check valve is not opened by pilot pressure and the hydraulic oil in the rodless cavity fails to return to the oil tank, enabling safe operation of the attachment.

In some embodiments, a detachment process of the attachment is performed through steps of:

feeding the hydraulic oil by the main pump into the rod cavity of the cylinder of the hydraulic integrated switching part;

at the same time, opening the pilot-operated check valve to push the piston rod to move from the high-pressure cavity to the low-pressure cavity to make the piston rod draw back;

returning the locking pin and the locking assembly of the hydraulic integrated switching part backward to detach the locking pin from the welding pin and detach the locking assembly from the connector fixing plate of the connecting base; and

at the same time, allowing the hydraulic oil in the rodless cavity of the cylinder to return to the oil tank through the pilot-operated check valve, thereby interrupting the connection of the mechanics, electronics and hydraulics.

The present disclosure has the following beneficial effects.

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The hydraulic conversion platform provided herein solves the problems in the prior art, such as time-consuming and laborious replacement, low operation efficiency, high failure rate and complicated arrangement of attachment pipelines. Through the hydraulic conversion platform of the application, the replacement of the attachment and connection of pipelines can be completed within 2-4 s without manual operations.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a hydraulic conversion platform according to an embodiment of the present disclosure.

FIG. 2 is a perspective view of a main body of the hydraulic conversion platform according to an embodiment of the present disclosure.

FIG. 3 is a perspective view of a connecting part of the hydraulic conversion platform according to an embodiment of the present disclosure.

FIG. 4 is a perspective view of a hydraulic integrated switching part according to an embodiment of the present disclosure.

FIG. 5 is another perspective view of the hydraulic integrated switching part according to an embodiment of the present disclosure.

FIG. 6 is a schematic diagram of an oil cylinder of the hydraulic integrated switching part according to an embodiment of the present disclosure.

FIG. 7 is a schematic diagram of a locking assembly of the hydraulic conversion platform according to an embodiment of the present disclosure.

FIG. 8 is a schematic diagram of a pilot-operated check valve of the hydraulic conversion platform according to an embodiment of the present disclosure.

FIG. 9 schematically shows arrangement of the pilot-operated check valve

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according to an embodiment of the present disclosure.

FIG. 10 schematically shows arrangement of pipelines among the locking assembly, a transition joint A and a transition joint B according to an embodiment of the present disclosure.

FIG. 11 schematically shows the hydraulic conversion platform in a coupling state according to an embodiment of the present disclosure.

FIG. 12 is a sectional view of the hydraulic conversion platform along A-A in Fig. 11.

FIG. 13 schematically illustrates a moving trajectory of a second positioning pin according to an embodiment of the present disclosure.

FIG. 14 is a schematic diagram of a hydraulic principle according to an embodiment of the present disclosure.

FIG. 15 schematically shows an attachment process according to an embodiment of the present disclosure.

FIG. 16 schematically shows a detachment process according to an embodiment of the present disclosure.

In the drawings: 1, main body; 2, connecting part; 3, hydraulic integrated switching part; 4, quick coupling main body; 5, hook; 6, second positioning pin; 7, transition joint A; 8, transition joint B; 9, grease joint; 10, connecting base; 11, welding pin; 12, connector fixing plate; 13, third positioning pin; 14, male quick plug-in connector; 15, male electrical connector; 16, locking assembly; 17, locking pin; 18, end cover; 19, piston rod; 20, limit block; 21, limit pin; 22, pilot-operated check valve; 23, plate-opening pin; 24, first positioning pin; 25, spring; 26, dust cover plate; 27, female quick plug-in connector; 28, female electrical connector; 30, upper connecting portion; 31, upper connecting side plate; 32, housing pin; 33, lower

coupling base; 34, lower connecting side plate; 35, clamping groove; 36, pin-fastening orifice plate; 37, connecting base plate; 38, connecting lug plate; 39, connecting hook; 16.1, cylinder; 16.2, mounting plate; 16.3, check valve mounting hole; 16.4, oil hole; 16.51, oil inlet; 16.52, oil return hole; 16.53, female electrical connector mounting hole; 16.54, female quick plug-in connector mounting hole; 16.55, first matching hole; 16.56, second matching hole.

DETAILED DESCRIPTION OF EMBODIMENTS

The principles and features of the present disclosure will be further described in detail with reference to the accompanying drawings. The embodiments presented in the drawings are merely illustrative of the disclosure, and are not intended to limit the scope of the present disclosure.

Referring to Figs. 1 and 3-4, a hydraulic conversion platform is provided, including a hydraulic integrated switching part 3 and a connecting part 2.

The hydraulic integrated switching part 3 is provided with a female quick plug-in connector 27 and a female electrical connector 28. The connecting part 2 is provided with a male quick plug-in connector 14 and a male electrical connector 15. The female quick plug-in connector 27 is matched with the male quick plug-in connector 14. The female electrical connector 28 is matched with the male electrical connector 15.

Referring to Figs. 4-12, the hydraulic integrated switching part 3 also includes a locking assembly 16. The locking assembly 16 includes two cylinders 16.1 mounted on both sides of the locking assembly 16 and a mounting plate 16.2 between the two cylinders 16.1. The mounting plate 16.2 is provided with a check valve mounting hole 16.3, four oil holes connecting with the two cylinders 16.4, an oil inlet 16.51, an oil return hole 16.52, a female electrical connector mounting hole 16.53 and a female

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quick plug-in connector mounting hole 16.54.

The mounting plate 16.2 is also provided with a second matching hole 16.56 for the insertion of a plate-opening pin 23 and a first matching hole 16.55 for a first positioning pin 24, where the first positioning pin 24 is a plate-type pin. The mounting plate 16.2 has a convex structure. The check valve mounting hole 16.3, the oil inlet 16.51, the oil return hole 16.52 and the four oil holes 16.4 are mounted on a raised part of the mounting plate 16.2, and other mounting holes are mounted on a lower part of the mounting plate 16.2. The oil inlet 16.51, the oil return hole 16.52 and the four oil holes 16.4 are communicated through an oil passage. A pilot-operated check valve 22 is provided at the check valve mounting hole 16.3. The four oil holes 16.4 are connected to the two cylinders 16.1 through a pipeline. Two ends of each of the two cylinders 16.1 are provided with a locking pin 17 and an end cover 18, respectively. A piston rod 19 is provided in each of the two cylinders 16.1. An end of the piston rod 19 extends out of the end cover 18. A limit block 20 is fixedly provided at the end of the piston rod 19 extending out of the end cover 18. The female quick plug-in connector 27 and the female electrical connector 28 are mounted on the mounting plate 16.2, and coupling ends of the female quick plug-in connector 27 and the female electrical connector 28 are both provided on a side of the locking pin 17. The mounting plate 16.2 is also movably inserted with the first positioning pin 24 and the plate-opening pin 23, that is, the first positioning pin 24 and the plate-opening pin 23 can move relatively along a radial direction of holes on the mounting plate 16.2. A dust cover plate 26 is hingedly provided on the mounting plate 16.2. The first positioning pin 24 is sleeved with a spring 25.

The locking pin 17 and the end cover 18 are fixedly provided on two ends of the cylinder 16.1 of the locking assembly 16 through bolts, respectively. The piston rod 19 is provided in the cylinder 16.1 of the locking assembly 16. Oil feed and discharge of a rod cavity and a rodless cavity of the hydraulic integrated switching part 3 are controlled to enable connection of the oil circuit and the electric circuit and the

mechanical locking. The limit block 20 is fixedly provided on an end of the piston rod 19 through a limit pin 21 and a snap spring, and is fixedly provided at an inner end surface of the main body 1 by cold charging. The limit block 20 is configured to fix and support the hydraulic integrated switching part 3. The pilot-operated check valve 22 is mounted on the locking assembly 16. If an interruption suddenly occurs to the high-pressure oil fed to the rodless cavity of the hydraulic integrated switching part 3, the locking pin 17 is still in a locking state to maintain the connection of the oil circuit and the electric circuit since the pilot-operated check valve 22 is not opened by pilot pressure and the hydraulic oil in the rodless cavity fails to return to the oil tank, which can prevent the attachment from falling off caused by retraction of the locking pin 17 and cut-off of the electric circuit and the oil circuit, avoiding the occurrence of accidents. The dust cover plate 26 is fixedly provided on a front end of mounting plate 16.2 by bolts, and the plate-opening pin 23 is configured to control the opening and closing of the dust cover plate 26. In addition, the plate-opening pin 23 and the first positioning pin 24 also have functions of positioning and guiding. The quick coupling main body 4 and the locking assembly 16 have high processing and positioning accuracy, which can accurately ensure the relative position of the locking assembly 16 and the main body 1 to facilitate the smooth and accurate coupling of the quick-plug connectors and the electrical connectors. The female quick plug-in connector 27 and the female electrical connector 28 are fixedly provided at corresponding shaft holes on the locking assembly 16, respectively, and they are coupled with corresponding male connectors to complete the switching of the oil circuit and the electric circuit.

The hydraulic integrated switching part 3 in the above embodiment is fixedly mounted on a main body 1. Referring to Figs. 1-2, the main body 1 includes the quick coupling main body 4. The quick coupling main body 4 includes a lower coupling base 33 and an upper connecting portion 30. The upper connecting portion 30 includes a pair of upper connecting side plates 31. A pair of housing pins 32 is provided on the upper connecting side plates 31. At least one of the pair of upper

connecting side plates 31 is provided with a transition joint A 7 and/or a transition joint B 8. An end of the upper connecting side plate 31 is provided with a hook 5. The lower coupling base 33 includes a pair of lower connecting side plates 34. A rear part of each of the pair of lower connecting side plates 34 is provided with a clamping groove 35. A front part of each of the pair of the lower connecting side plates 34 is provided with a pin-fastening orifice plate 36. A gap is provided between the two pin-fastening orifice plates 36. The hydraulic integrated switching part 3 is provided between the pair of lower connecting side plates 34. The locking pin 17 passes through a round hole on the corresponding pin-fastening orifice plate 36. Each of the pair of lower connecting side plates 34 is provided with a second positioning pin 6. The quick coupling main body 4 is made of special alloy with high strength and long service life. The hook 5 is welded to the quick coupling main body 4 for the convenience of hoisting and transportation. The second positioning pin 6 is mounted on the quick coupling main body 4, which can guide and limit the relative position of the main body 1 and the connecting part 2. The transition joint A 7 and/or the transition joint B 8 are fixedly provided on the quick coupling main body 4 by bolts, which play a role as bridges to connect the internal and external pipelines. A grease joint 9 is mounted on the quick coupling main body 4. Grease should be regularly filled into the hydraulic conversion platform with a grease gun, so as to lubricate the locking pin 17 and reduce abrasion.

Referring to Figs. 1 and 3, the connecting part 2 further includes a connecting base 10. The connecting base 10 includes a connecting base plate 37 and a pair of connecting lug plates 38 provided thereon. Each of the pair of connecting lug plates 38 is both provided with a connecting hook 39. Two welding pins 11 are mounted in parallel between the pair of connecting lug plates 38. The connector fixing plate 12 is provided on the connecting base plate 37 and is provided between the two welding pins 11. A middle of the connector fixing plate 12 is provided with the male quick plug-in connector 14 and the male electrical connector 15. A side of the connector

fixing plate 12 coupled with the female quick plug-in connector 27 is provided with a third positioning pin 13 for coupling. The male quick plug-in connector 14 and the male electrical connector 15 are fixedly provided at the corresponding shaft holes on the connector fixing plate 12, respectively, and they are coupled with the corresponding female connectors to realize the switching of the oil circuit and the electric circuit.

A control method of the above hydraulic conversion platform is performed through the following steps.

As shown in Figs. 1-16, this application provides a hydraulic conversion platform and a control method thereof, which realize the integrated switching of mechanics, electronics and hydraulics and greatly shorten the coupling between an excavator and an attachment, thereby improving work efficiency.

A main body 1 of the hydraulic conversion platform is connected to an arm and a connecting rod of an excavator through housing pins 32, and a connecting base 10 of a connecting part 2 is mounted on an attachment.

The main body 1 of the hydraulic conversion platform gets close to the connecting part 2. A Clamping groove 35 of each of the pair of lower connecting side plates 34 clamps a welding pin 11 of the connecting base 10. An angle of the arm of the excavator is adjusted to keep a bottom of the main body 1 level with the connecting base 10. Hydraulic oil drives a piston rod 19 of a hydraulic integrated switching part 3 to stretch out and draw back to lock a structure and achieve connections of oil circuit and electric circuit at the same time.

An attachment process of the attachment to the excavator is performed through the following steps.

The hydraulic oil by a main pump is fed into a rodless cavity of a cylinder 16.1 of the hydraulic integrated switching part 3 through a pilot-operated check valve 22. The

hydraulic oil drives the piston rod 19 to move from a high-pressure cavity to a low-pressure cavity to stretch the piston rod 19 out. A locking pin 17 and a locking assembly 16 of the hydraulic integrated switching part 3 are pushed forward at the same time, where the locking pin 17 moves forward to lock the welding pin 11 of the connecting base 10 to complete the mechanical coupling, and the locking assembly 16 moves forward to couple with a connector fixing plate 12, thereby achieving connection of the oil circuit and the electric circuit. At the same time, the hydraulic oil in a rod cavity of the cylinder 16.1 returns to an oil tank to complete the integrated switching of mechanics, electronics and hydraulics. In the process, if an interruption suddenly occurs to the hydraulic oil, the locking pin 17 is still in a locking state to maintain the connection of the oil circuit and the electric circuit since the pilot-operated check valve 22 is not opened by pilot pressure and the hydraulic oil in the rodless cavity fails to return to the oil tank, enabling safe operation of the attachment.

A detachment process of the attachment is performed through the following steps.

The hydraulic oil by the main pump is fed into the rod cavity of the cylinder 16.1 of the hydraulic integrated switching part 3. At the same time, the pilot valve is opened to push the piston rod 19 to move from the high-pressure cavity to the low-pressure cavity to make the piston rod 19 draw back. The locking pin 17 and a locking assembly 16 of the hydraulic integrated switching part 3 are returned backward to detach the locking pin 17 from the welding pin 11 and detach the locking assembly 16 from the connector fixing plate 12 of the connecting base 10. At the same time, the hydraulic oil in the rodless cavity of the cylinder 16.1 returns to the oil tank through the pilot-operated check valve 22, thereby interrupting the connection of the mechanics, electronics and hydraulics.

Described above are only preferred embodiments of this application, and are not

intended to limit this application. Any modification, replacement and improvement made without departing from the spirit of this application shall fall within the scope of this application.

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What is claimed is:

1. A hydraulic conversion platform, comprising:

a hydraulic integrated switching part (3); and

a connecting part (2);

characterized in that the hydraulic integrated switching part (3) is provided with a female quick plug-in connector (27) and a female electrical connector (28); the connecting part (2) is provided with a male quick plug-in connector (14) and a male electrical connector (15); the female quick plug-in connector (27) is matched with the male quick plug-in connector (14); and the female electrical connector (28) is matched with the male electrical connector (15);

the hydraulic integrated switching part (3) further comprises a locking assembly (16); the locking assembly (16) comprises two cylinders (16.1) mounted on both sides of the locking assembly (16) and a mounting plate (16.2) provided between the two cylinders (16.1); the mounting plate (16.2) is provided with a check valve mounting hole (16.3), four oil holes (16.4) connecting with the two cylinders (16.1), an oil inlet (16.51), an oil return hole (16.52), a female electrical connector mounting hole (16.53) and a female quick plug-in connector mounting hole (16.54); the oil inlet (16.51), the oil return hole (16.52) and the four oil holes (16.4) are communicated through an oil passage; a pilot-operated check valve (22) is provided at the check valve mounting hole (16.3); the four oil holes (16.4) are connected to the two cylinders (16.1) through a pipeline; two ends of each of the two cylinders (16.1) are provided with a locking pin (17) and an end cover (18), respectively; a piston rod (19) is provided in each of the two cylinders (16.1); an end of the piston rod (19) extends out of the end cover (18); a limit block (20) is fixedly provided at the end of the piston rod (19) extending out of the end cover (18); and the female quick plug-in connector (27) and the female

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electrical connector (28) are mounted on the mounting plate (16.2), and coupling ends of the female quick plug-in connector (27) and the female electrical connector (28) are both provided on a side of the locking pin (17).

2. The hydraulic conversion platform according to claim 1, characterized in that the mounting plate (16.2) is further movably inserted with a first positioning pin (24) and a plate-opening pin (23); the first positioning pin (24) is a plate-type pin; a dust cover plate (26) is hingedly provided on the mounting plate (16.2); and the first positioning pin (24) is sleeved with a spring (25).

3. The hydraulic conversion platform according to claim 2, characterized in that the spring (25) is a compression spring.

4. The hydraulic conversion platform according to claim 1, characterized in that the hydraulic integrated switching part (3) is fixedly provided on a main body (1).

5. The hydraulic conversion platform according to claim 4, characterized in that the main body (1) comprises a quick coupling main body (4); the quick coupling main body (4) comprises a lower coupling base (33) and an upper connecting portion (30); the upper connecting portion (30) comprises a pair of upper connecting side plates (31); a pair of housing pins (32) is provided on the pair of upper connecting side plates (31); at least one of the pair of upper connecting side plates (31) is provided with a transition joint A (7) and/or a transition joint B (8); the lower coupling base (33) comprises a pair of lower connecting side plates (34); a rear part of each of the pair of lower connecting side plates (34) is provided with a clamping groove (35); a front part

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of each of the pair of lower connecting side plates (34) is provided with a pin-fastening orifice plate (36); a gap is provided between the pin-fastening orifice plates (36) at two sides; the hydraulic integrated switching part (3) is provided between the pair of lower connecting side plates (34); and a locking pin (17) passes through a round orifice on the corresponding pin-fastening orifice plate (36).

6. The hydraulic conversion platform according to claim 5, characterized in that each of the pair of lower connecting side plates (34) is provided with a second positioning pin (6).

7. The hydraulic conversion platform according to claim 1, characterized in that the connecting part (2) further comprises a connecting base (10); the connecting base (10) comprises a connecting base plate (37) and a pair of connecting lug plates (38) provided thereon; each of the pair of connecting lug plates (38) is provided with a connecting hook (39); two welding pins (11) are mounted in parallel between the pair of connecting lug plates (38); a connector fixing plate (12) is provided on the connecting base plate (37) and is provided between the two welding pins (11); a middle of the connector fixing plate (12) is provided with the male quick plug-in connector (14) and the male electrical connector (15); and a side of the connector fixing plate (12) coupled with the female quick plug-in connector (27) is provided with a third positioning pin (13) for coupling.

8. A control method of the hydraulic conversion platform of claim 7, comprising:

connecting a main body (1) of the hydraulic conversion platform to an arm and a connecting rod of an excavator through housing pins (32); and mounting a connecting base (10) of a connecting part (2) on an attachment;

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allowing the main body (1) of the hydraulic conversion platform to get close to the connecting part (2); allowing clamping grooves (35) of a pair of lower connecting side plates (34) to clamp a welding pin (11) of the connecting base (10); adjusting an angle of the arm of the excavator to keep a bottom of the main body (1) level with the connecting base (10); and driving a piston rod (19) of a hydraulic integrated switching part (3) to stretch out and draw back by hydraulic oil to perform structural locking and achieve connections of oil circuit and electric circuit at the same time.

9. The control method according to claim 8, characterized in that an attachment process of the attachment to the excavator is performed through steps of:

feeding hydraulic oil by a main pump into a rodless cavity of a cylinder (16.1) of the hydraulic integrated switching part (3) through a pilot-operated check valve (22);

pushing the piston rod (19) to move from a high-pressure cavity to a low-pressure cavity by the hydraulic oil to stretch the piston rod (19) out;

pushing a locking pin (17) and a locking assembly (16) of the hydraulic integrated switching part (3) forward at the same time, wherein the locking pin (17) moves forward to lock the welding pin (11) of the connecting base (10) to complete a mechanical coupling, and the locking assembly (16) moves forward to couple with a connector fixing plate (12) of the connecting base (10), thereby achieving the connections of the oil passages and the electric circuits; and

at the same time, allowing the hydraulic oil in a rod cavity of the cylinder (16.1) to return to an oil tank to complete an integrated switching of mechanics, electronics and hydraulics; and

in the process, if an interruption suddenly occurs to the hydraulic oil, the locking pin (17) is still in a locking state to maintain the connection of the oil passages and the electric circuits since the pilot-operated check valve (22) is not opened by pilot

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pressure and the hydraulic oil in the rodless cavity fails to return to the oil tank, enabling safe operation of the attachment; and

a detachment process of the attachment is performed through steps of:

feeding the hydraulic oil by the main pump into the rod cavity of the cylinder (16.1) of the hydraulic integrated switching part (3);

at the same time, opening the pilot-operated check valve (22) to push the piston rod (19) to move from the high-pressure cavity to the low-pressure cavity to make the piston rod (19) draw back;

returning the locking pin (17) and the locking assembly (16) of the hydraulic integrated switching part (3) backward to detach the locking pin (17) from the welding pin (11) and detach the locking assembly (16) from the connector fixing plate (12) of the connecting base (10); and

at the same time, allowing the hydraulic oil in the rodless cavity of the cylinder (16.1) to return to the oil tank through the pilot-operated check valve (22), thereby interrupting the connection of the mechanics, electronics and hydraulics.

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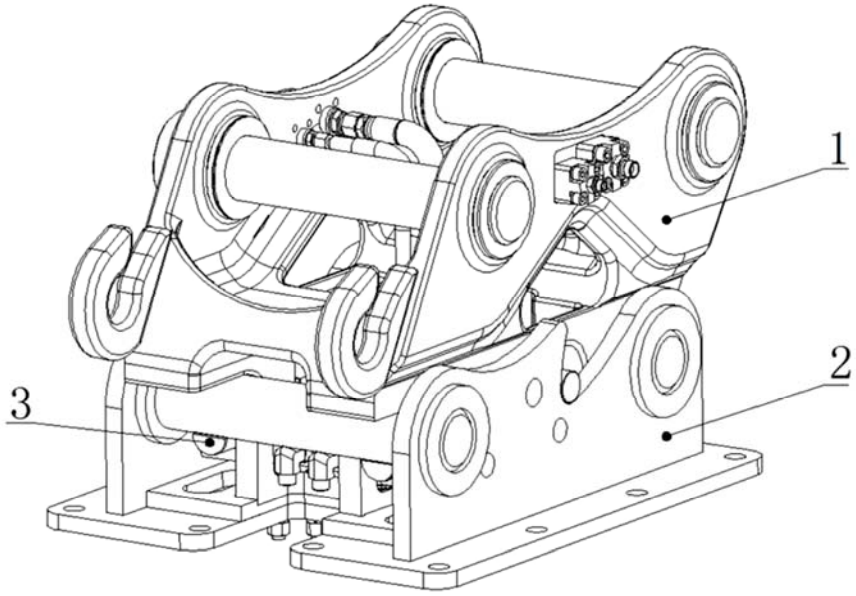

FIG. 1

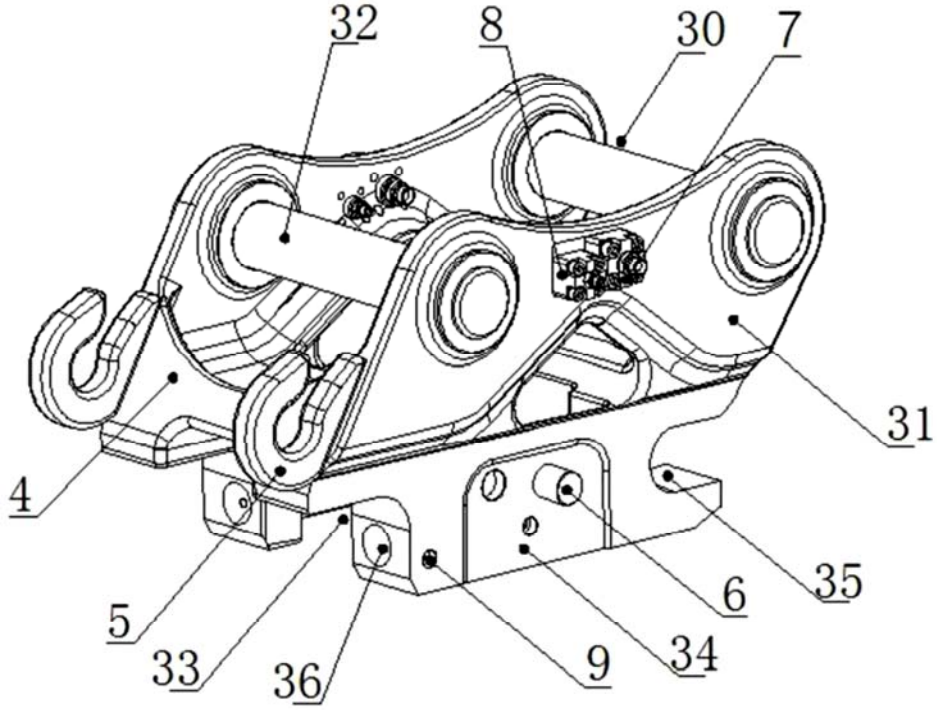

FIG. 2

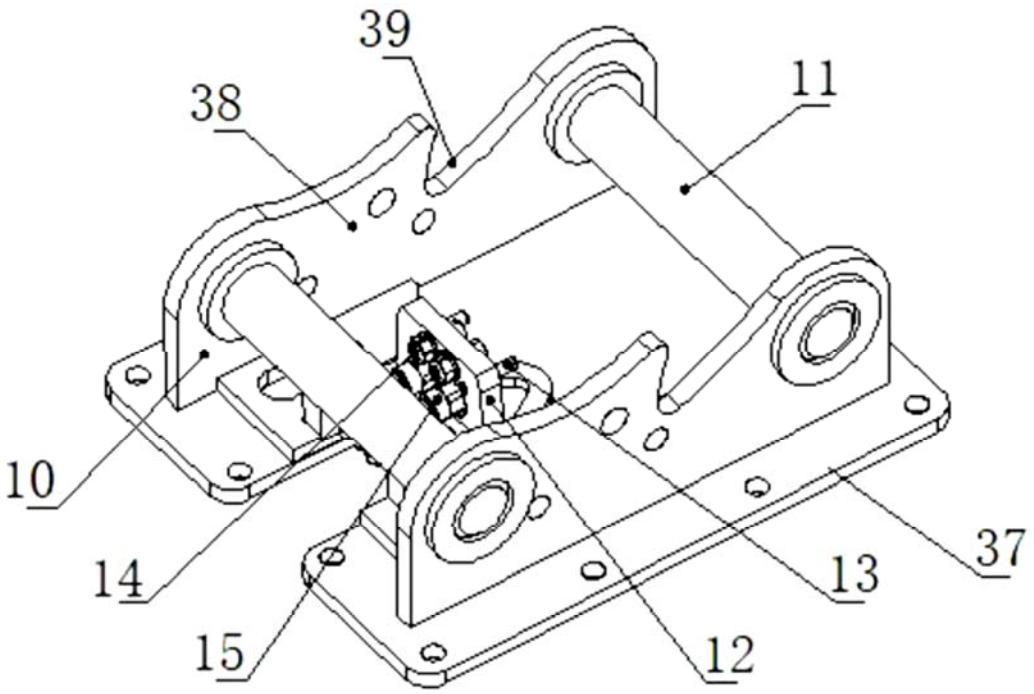

FIG. 3

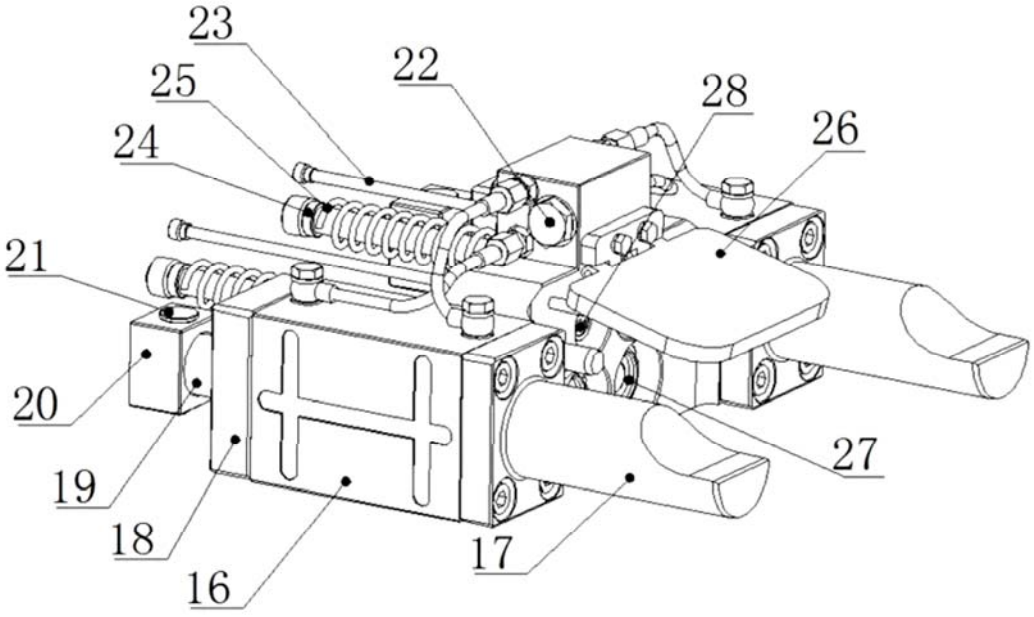

FIG. 4

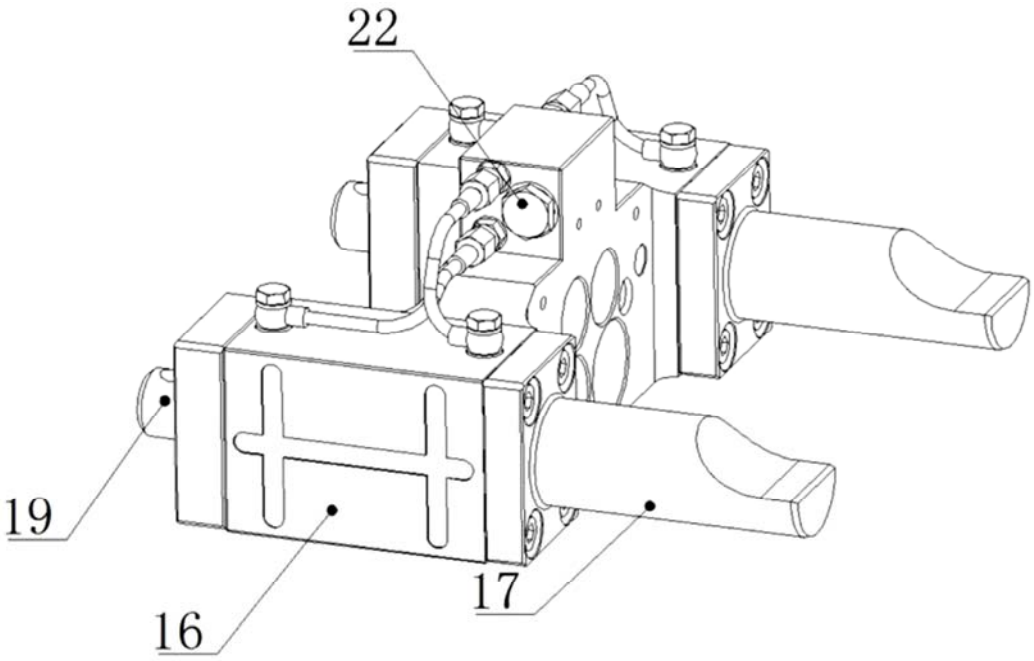

FIG. 5

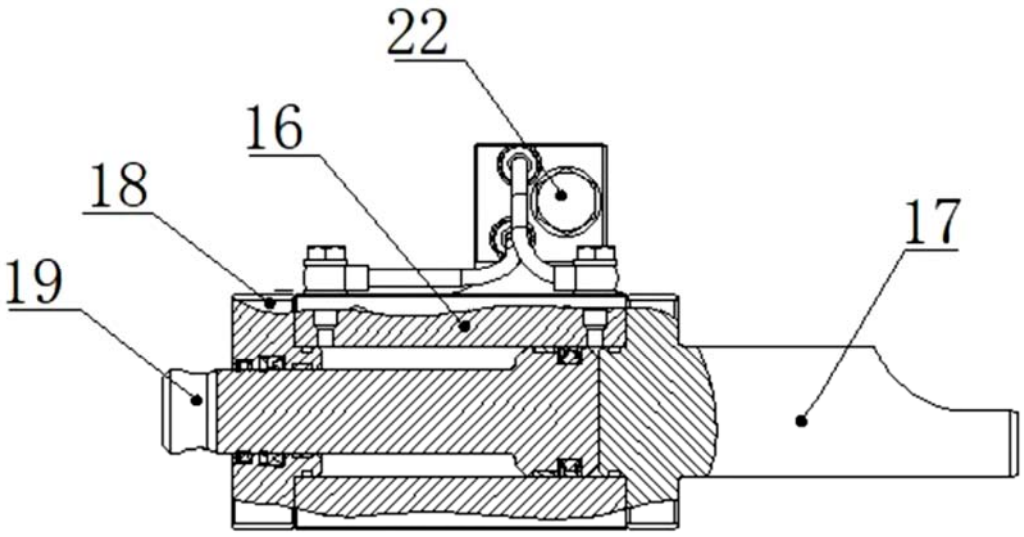

FIG. 6

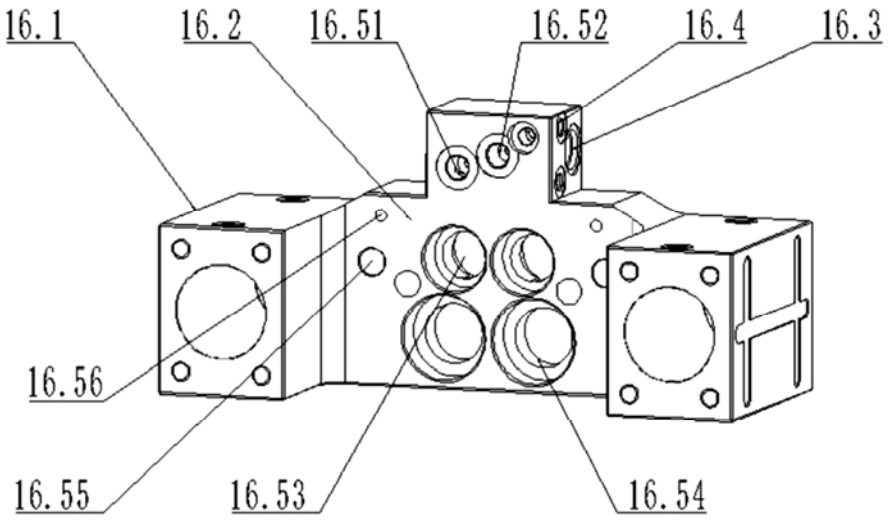

FIG. 7

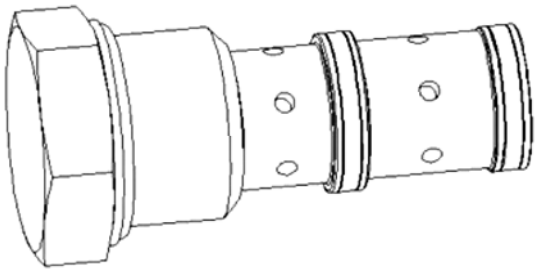

FIG. 8

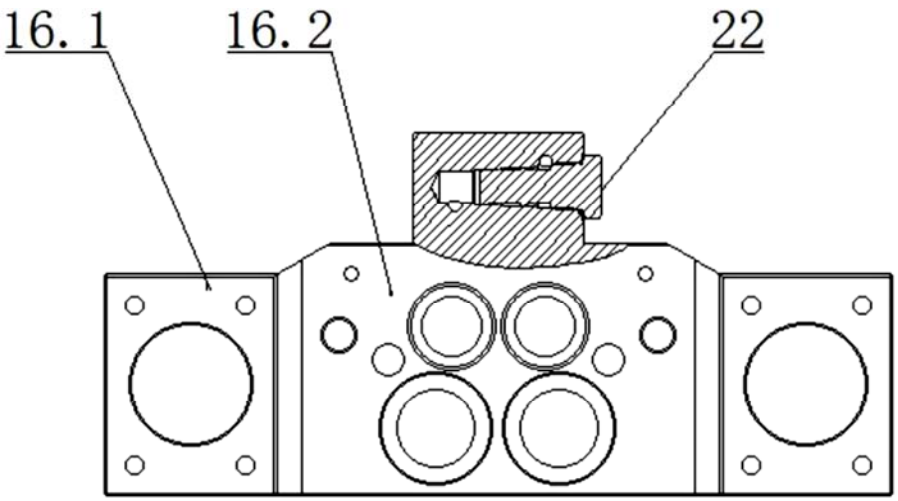

FIG. 9

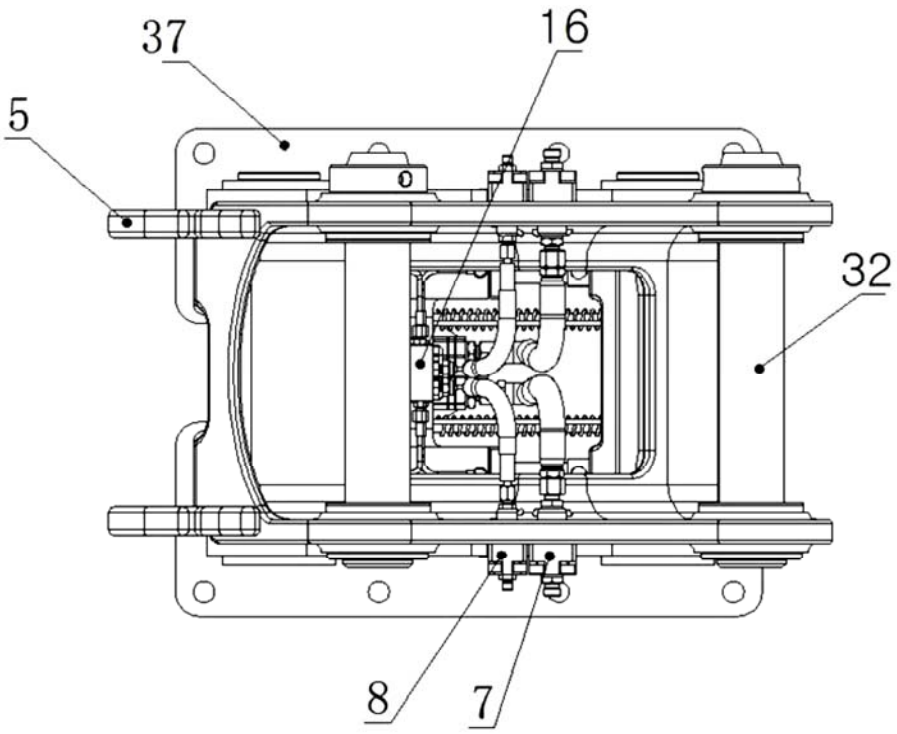

FIG. 10

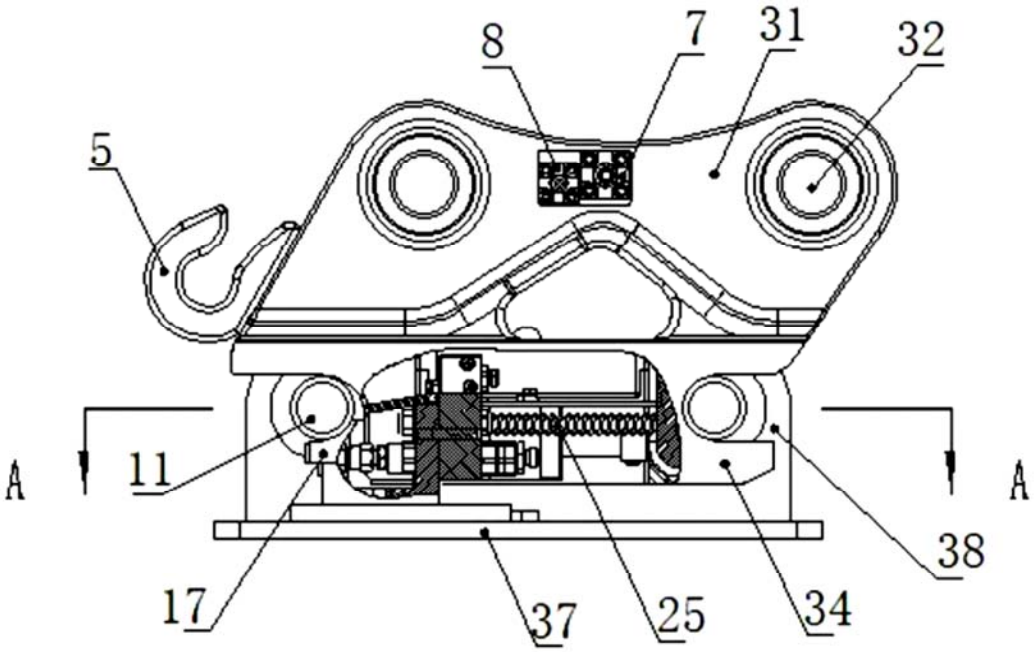

FIG. 11

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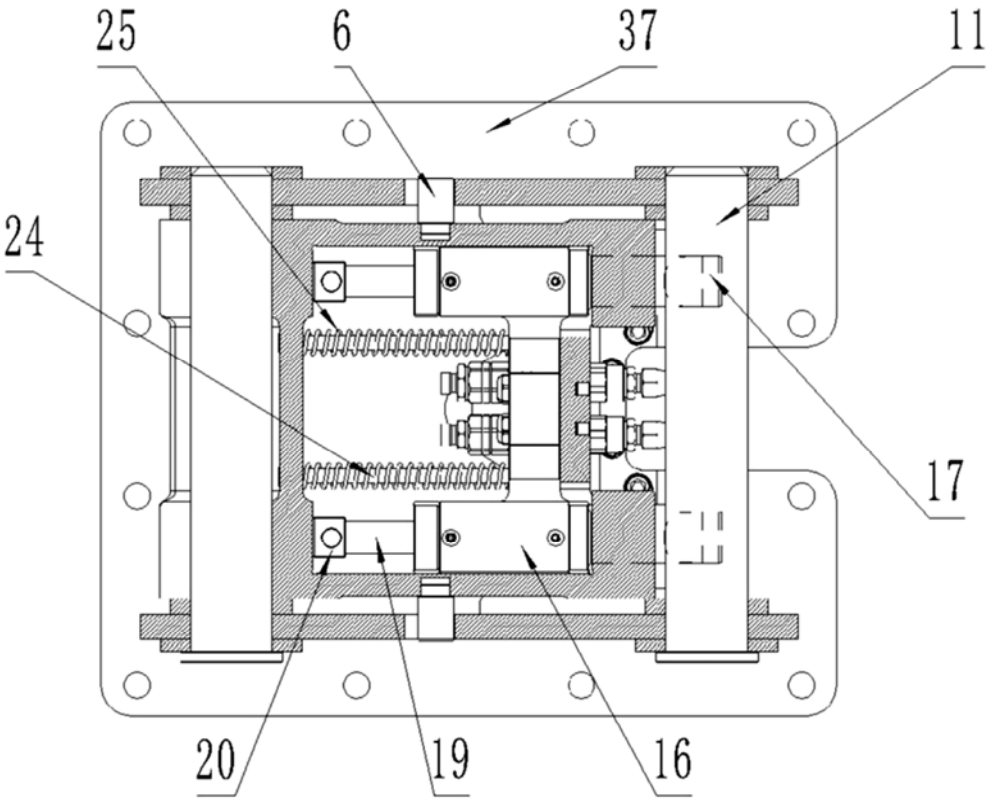

FIG. 12

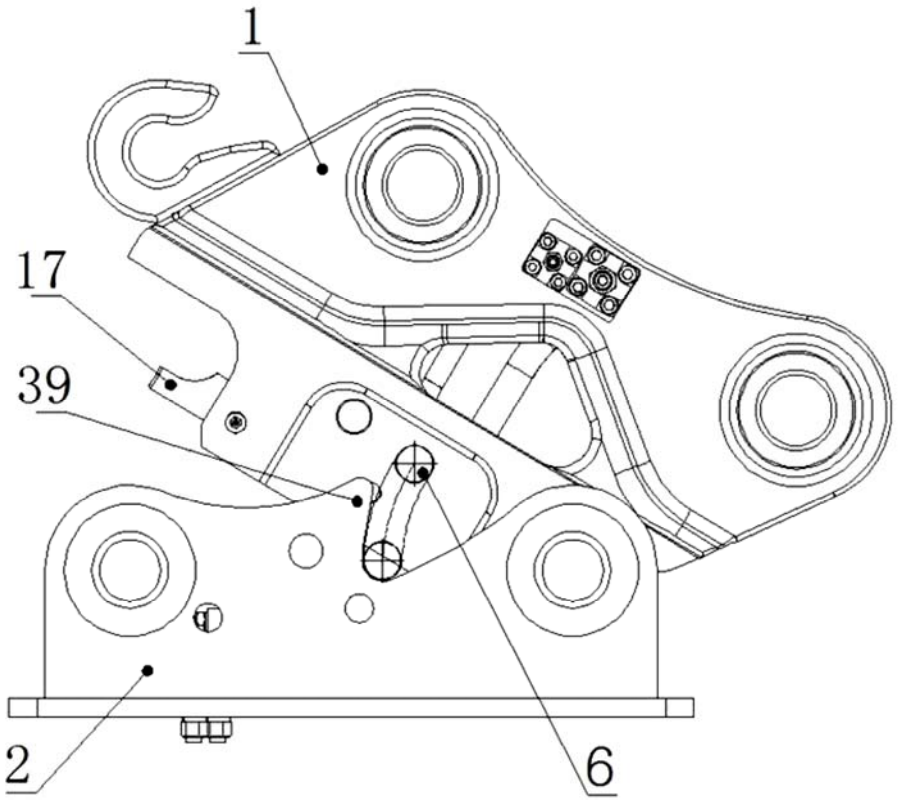

FIG. 13

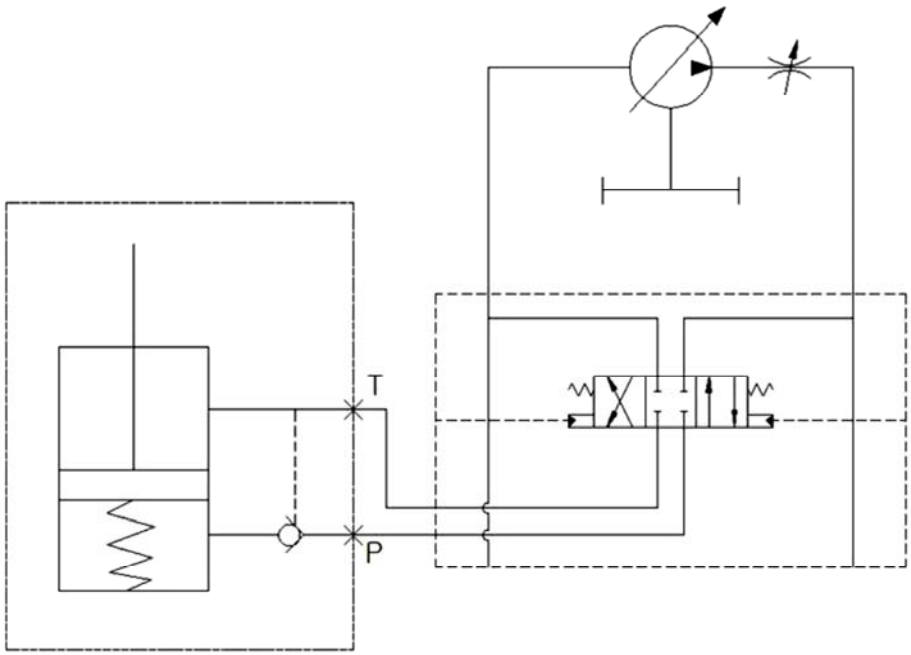

FIG. 14

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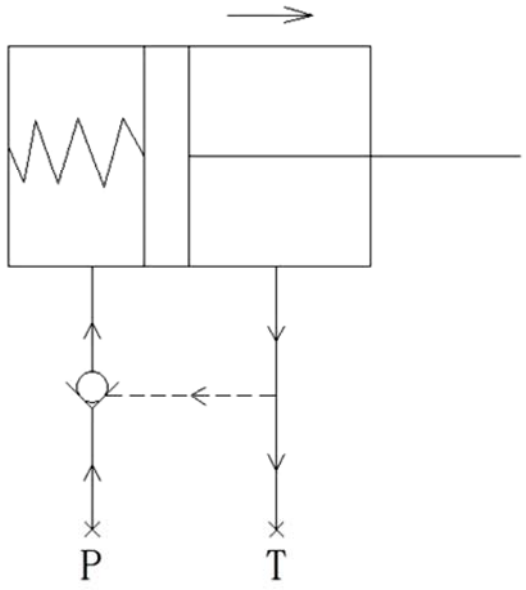
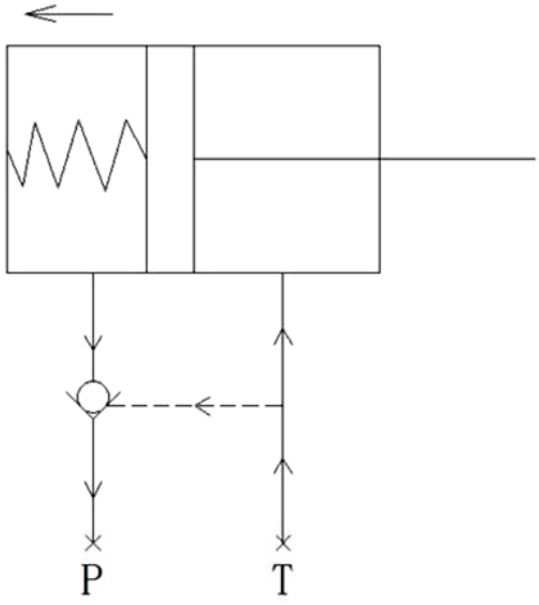


Attachment process

FIG. 15



Detachment process

FIG. 16