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(54) CONCRETE PUMP AND METHOD FOR ADJUSTING VALUE OF DRIVE PRESSURE TO SWINGING ACTUATOR THEREOF

(57) A concrete pump and a method for adjusting the driving pressure value of an oscillating actuator in the concrete pump are disclosed. The concrete pump includes an oscillating actuator and an S-shaped distribution valve(17), wherein the oscillating actuator is driven by an oscillating hydraulic circuit to control the oscillation of the S-shaped distribution valve. The oscillating hydraulic circuit includes an oscillating driving pressure control module which adjusts the oscillation driving pressure value F of the oscillating actuator from the oscillating hydraulic circuit according to a first pressure value F1 and/or a second pressure value F2, where the first pressure value F1 is the oil hydraulic value in a stirring hydraulic circuit, and the second pressure value F2 is the oil hydraulic value in a concrete cylinder hydraulic circuit. The concrete pump avoids too high or too low pressure of the S-shaped distribution valve, which is provided by the actuator, caused by different types of concrete or other working conditions, and accordingly prevents the S-shaped distribution valve from generating high-speed impact and noise and the structure body from generating inertial impact and vibration.

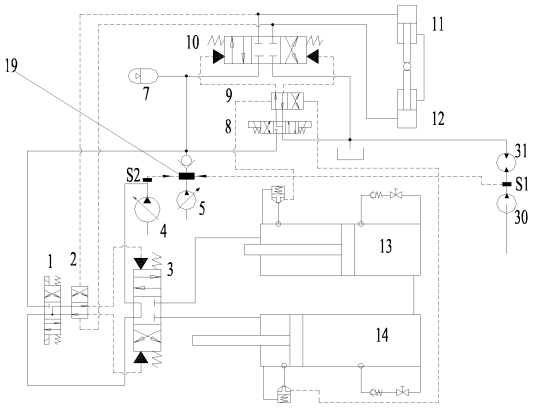

Fig. 4

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Description

Technical Field of the Invention

[0001] The invention relates to the field of concrete pumps, in particular to a concrete pump and a method for adjusting the driving pressure value of an oscillating actuator therein.

Background of the Invention

[0002] As shown in Figs. 1 and 2, a concrete pump includes a conveying pipe A for conveying concrete to the destination and a main machine B, wherein the main machine of the concrete pump includes a hopper 18, a pair of concrete cylinders (a first concrete cylinder 20 and a second concrete cylinder 21), a pair of main cylinders (a first main cylinder 13 and a second main cylinder 14), an S-shaped distribution valve 17, a pair of oscillating cylinders (a first oscillating cylinder 11 and a second oscillating cylinder 12) etc. The concrete cylinders are used for pumping concrete from the hopper to the conveying pipe and are driven by the main cylinders alternately moving; the S-shaped distribution valve 17 is located in the hopper 18 and connected with the conveying pipe, and is connected with one of the concrete cylinders alternately to distribute concrete; at the moment, the other of the concrete cylinders sucks concrete from the hopper. Specifically, the alternate oscillation of the S-shaped distribution valve is implemented by one or more actuators (such as the oscillating cylinders).

[0003] In addition, as shown in Fig. 3, the concrete pump further includes an accumulator 7 and a constant-pressure pump 5. The accumulator 7 provides a pressure impact to enable the S-shaped distribution valve to reach enough acceleration and speed during oscillation so as to ensure the coordination between the pumping action and the distribution pipe, and enough flow. The actuator is mainly used for driving the gravity of the S-shaped distribution valve, a friction between the S-shaped distribution valve and other mechanical parts, a force for cutting a concrete column in the S-shaped distribution valve, and the resistance of the concrete in the hopper 18. The constant-pressure pump 5 is used for providing pressure oil to the accumulator 7 and determines the upper pressure limit of the accumulator 7. When the pressure of the accumulator 7 is charged to the target value, called the pressure cutting value of the constant-pressure pump 5, the output flow of the constant-pressure pump 5 decreases automatically, even to 0; at the moment, the pressure in the accumulator 7 is equal to the pressure cutting value of the constant-pressure pump 5.

[0004] As shown in Fig. 2, the pumping logics of the concrete pump in the art are as follows:

[0005] When the first main cylinder 13 is propelled under the control of a control system, the first oscillating cylinder 11 and the second oscillating cylinder 12 will drive the S-shaped distribution valve to be connected with the first concrete cylinder 20 at the side of the first main cylinder 13; at the moment, the first main cylinder 13 pushes the concrete in the first concrete cylinder 20 into the S-shaped distribution valve, and the second main cylinder 14 sucks the concrete in the hopper 18 into the second concrete cylinder 21. When the two main cylinders move to a predetermined position, a conversion will be made as follows: when the second main cylinder 14 is propelled under the control of a power source and the control system, the oscillating cylinders will drive the S-shaped distribution valve to oscillate to be connected with the second concrete cylinder 21 at the side of the second main cylinder 14; at the moment, the second main cylinder 14 pushes the concrete in the second concrete cylinder 21 into the S-shaped distribution valve, and the first main cylinder 13 sucks the concrete in the hopper 18 into the first concrete cylinder 20 till the two main cylinders move to the predetermined position again. The system will repeat all the logics above. Thus, the concrete in the hopper 18 is output to the S-shaped distribution valve continuously, and then conveyed to the destination through the conveying pipe (as shown in Fig. 1) by the concrete pump.

[0006] Fig. 3 shows a hydraulic control circuit to implement the logics above, wherein a first electromagnetic reversing valve 1 and a first small oil controlled reversing valve 2 are used for driving a first oil controlled reversing valve 3 to reverse, and the first oil controlled reversing valve 3 is used for driving the main cylinders to reverse; and similarly, a second electromagnetic reversing valve 8 and a second small oil controlled reversing valve 9 are used for driving a second oil controlled reversing valve 10 to reverse, and the second oil controlled reversing valve 10 is used for driving the oscillating cylinders to reverse. Wherein the main cylinders include a first main cylinder 13 and a second main cylinder 14; and the oscillating cylinders include a first oscillating cylinder 11 and a second oscillating cylinder 12. A first oil pump 4 is used for driving the main cylinders; and a second oil pump 5 is used for driving the oscillating cylinders. The second oil pump 5 provides hydraulic oil to the accumulator 7, and the accumulator 7 drives the first oscillating cylinder 11 and the second oscillating cylinder 12 to oscillate.

[0007] When different types of concrete are pumped, the oil hydraulic pressure provided to the oscillating cylinders (the actuator) by the accumulator 7 may be too high or too low, thus the pressure provided to the S-shaped distribution valve by the actuator may be too high or too low. If the viscosity of the concrete in the hopper is low, the excessive pressure (energy) provided by the actuator will make the S-shaped distribution valve generate high-speed impact and noise, meanwhile, and will cause inertial impact and vibration to the whole structure body and unnecessary energy loss. If the viscosity of the concrete in the hopper is higher, the S-shaped distribution valve cannot oscillate as the pressure provided by the actuator is not enough. Sometimes, an op-

erator may manually adjust the oil hydraulic pressure provided to the oscillating cylinders (the actuator) by the accumulator 7 according to the working condition of a certain pumping, so as to adjust the pressure provided to the S-shaped distribution valve. However, the pressure should also be variable even under the condition that the same type of concrete is pumped.

Summary of the Invention

[0008] One technical problem to be solved by the invention is to provide a concrete pump, which can adjust the oscillation driving pressure value of an oscillating actuator provided by an oscillating hydraulic circuit according to the resistance on an S-shaped distribution valve.

[0009] Another technical problem to be solved by the invention is to provide a method for adjusting the driving pressure value of the oscillating actuator in the concrete pump.

[0010] In order to solve the technical problems, in one aspect, the invention provides a concrete pump, including: a hopper for being filled with concrete, an S-shaped distribution valve provided in the hopper, an oscillating actuator connected with the S-shaped distribution valve and driven by an oscillating hydraulic circuit to control the oscillation of the S-shaped distribution valve, a stirring mechanism provided in the hopper and driven by a stirring hydraulic circuit to stir the concrete in the hopper, and concrete cylinders connected with one end of the S-shaped distribution valve and driven by a concrete cylinder hydraulic circuit to output concrete outside or to suck concrete, characterized in that the oscillating hydraulic circuit includes an oscillating driving pressure control module, the oscillating driving pressure control module adjusts the oscillation driving pressure value F of the oscillating actuator provided by the oscillating hydraulic circuit according to a first pressure value F1 and/or a second pressure value F2, where the first pressure value F1 is the oil hydraulic pressure value in the stirring hydraulic circuit, and the second pressure value F2 is the oil hydraulic pressure value in the concrete cylinder hydraulic circuit.

[0011] Further, a stirring pressure sensor is provided in the stirring hydraulic circuit, and configured to detect the oil hydraulic pressure of the stirring hydraulic circuit and obtain the first pressure value F1; and a pumping pressure sensor is provided in the concrete cylinder hydraulic circuit, and configured to detect the oil hydraulic pressure value of the concrete cylinder hydraulic circuit and obtain the second pressure value F2.

[0012] Further, the oscillation driving pressure value F=F1*a+F2*b, where a is a first coefficient, and b is a second coefficient.

[0013] Further, the range of the first coefficient is 0.3-1, and the range of the second coefficient is 0.1-0.6.

[0014] Further, the oscillating actuator is oscillating cylinders; and the oscillating hydraulic circuit includes: an accumulator, an oil outlet of which is connected to the rod chambers or non-rod chambers of the oscillating cylinders to provide driving pressure for the oscillating cylinders; a constant-pressure pump, an oil outlet of which is connected with an oil inlet of the accumulator to provide hydraulic oil for the accumulator; and the driving pressure control module, which is a relief valve, and is provided in an oil circuit between the oil outlet of the constant-pressure pump and the oil inlet of the accumulator to adjust the pressure of the hydraulic oil output from the constant-pressure pump to the accumulator.

[0015] Further, the oscillating cylinders include a first oscillating cylinder and a second oscillating cylinder; and a second oil controlled reversing valve is provided between the accumulator and the first oscillating cylinder and the second oscillating cylinder, a main oil inlet of the second oil controlled reversing valve being connected with the oil outlet of the accumulator, a first working oil port of the second oil controlled reversing valve being connected with the non-rod chamber of the first oscillating cylinder, and a second working oil port of the second oil controlled reversing valve being connected with the non-rod chamber of the second oscillating cylinder.

[0016] Further, the concrete cylinders include a first concrete cylinder and a second concrete cylinder; and the concrete cylinder hydraulic circuit includes: a main oil pump, a first main cylinder and a second main cylinder, the piston rods of the first main cylinder and the second main cylinder are connected to the first concrete cylinder and the second concrete cylinders respectively, a first oil controlled reversing valve, a main oil inlet of which is connected with an oil outlet of the main oil pump, a first working oil port of which is connected with the rod chamber of the first main cylinder, and a second working oil port of which is connected with the rod chamber of the second main cylinder, and the pumping pressure sensor is provided in an oil circuit between the oil outlet of the main oil pump and the main oil inlet of the first oil controlled reversing valve.

[0017] Further, the stirring mechanism is a stirring shaft with blades; and the stirring hydraulic circuit includes: a stirring hydraulic motor, an output shaft of which is connected with the stirring shaft, a stirring oil pump, an oil outlet of which is connected with an oil inlet of the stirring hydraulic motor, and the stirring pressure sensor is provided in an oil circuit between the oil outlet of the stirring oil pump and the oil inlet of the stirring hydraulic motor.

[0018] In another aspect, the invention provides a method for adjusting the driving pressure value of an oscillating actuator in a concrete pump, including: receiving a first pressure value F1 and/or a second pressure value F2, where the first pressure value F1 is the oil hydraulic pressure value in a stirring hydraulic circuit; and the second pressure value F2 is the oil hydraulic pressure value in a pumping hydraulic circuit; and adjusting the driving pressure value F of the oscillating actuator from the oscillating hydraulic circuit according to the first pressure value F1 and/or the second pressure value F2.

[0019] Further, the step of adjusting the driving pressure value F of the oscillating actuator according to the first pressure value F1 and the second pressure value F2 includes: calculating the driving pressure value F according to the formula F=F1*a+F2*b, where a is a first coefficient, b is a second coefficient, and the first coefficient and the second coefficient are measured by an engineering test.

[0020] Further, the range of the first coefficient is 0.3-1, and the range of the second coefficient is 0.1-0.6.

[0021] The invention has the advantages as follows:

[0022] In the invention, the oscillating hydraulic circuit includes the oscillating driving pressure control module which adjusts the oscillation driving pressure value F of the oscillating actuator provided by the oscillating hydraulic circuit according to a first pressure value F1 and/or a second pressure value F2, where the first pressure value F1 is the oil hydraulic pressure value in the stirring hydraulic circuit; and the second pressure value F2 is the oil hydraulic pressure value in the concrete cylinder hydraulic circuit. Since the first pressure value F1 and second pressure value F2 can reflect the resistance of the S-shaped distribution valve during oscillating, the oscillating driving pressure control module can adjust the oscillation driving pressure value F of the oscillating actuator provided by the oscillating hydraulic circuit in real time according to the first pressure value F1 and second pressure value F2. Thus, the too high or too low pressure of the S-shaped distribution valve provided by the actuator, which is caused by different types of concrete or other working conditions, is avoided; further, the situation that the S-shaped distribution valve generates high-speed impact and noise and the inertial impact and vibration will happen to the whole structure, or the S-shaped distribution valve cannot oscillate will be avoided.

[0023] The invention further has other purposes, features and advantages besides those described above. The invention is further explained below with reference to the accompanying drawings in detail.

Brief Description of the Drawings

[0024] The drawings are to provide further understanding of the invention and constitute one part of the application, and the exemplary embodiments of the invention and the explanations thereof are intended to explain the invention, instead of improperly limiting the invention. In the drawings:

Fig. 1 is a whole structure view of a concrete pump;
Fig. 2 is a structure view of a concrete pump without a conveying pipe;
Fig. 3 is a hydraulic control circuit view of a concrete pump in the prior art;
Fig. 4 is a hydraulic control circuit view of a concrete pump according to the first embodiment of the invention; and
Fig. 5 is a flowchart of a method for adjusting the driving pressure value of an oscillating actuator in a concrete pump according to the first embodiment of the invention.

Detailed Description of the Embodiments

[0025] The embodiments of the invention will be described below in conjunction with the drawings in detail, but the invention can be implemented by various ways limited and covered by the claims.

[0026] As shown in Fig. 2, the main machine structure of a concrete pump according to the first embodiment of the invention, which is the same as the concrete pump in the prior art, includes a hopper 18, an S-shaped distribution valve 17, an oscillating actuator, a stirring mechanism and concrete cylinders, wherein the hopper 18 is filled with concrete; the S-shaped distribution valve 17 is located in the hopper 18; the oscillating actuator is connected with the S-shaped distribution valve 17 and is driven by an oscillating hydraulic circuit to control the oscillation of the S-shaped distribution valve 17; the stirring mechanism (not shown) is located in the hopper 18 and is driven by a stirring hydraulic circuit to stir the concrete in the hopper 18; and the concrete cylinders are connected with one end of the S-shaped distribution valve 17 and are driven by a concrete cylinder hydraulic circuit to input concrete into the S-shaped distribution valve 17 or suck concrete from the S-shaped distribution valve 17.

[0027] Preferably, it can be seen from Fig. 2 that, in the embodiment, the oscillating actuator is oscillating cylinders, more preferably, including a first oscillating cylinder 11 and a second oscillating cylinder 12. It can be seen from Fig. 3 that the oscillating hydraulic circuit includes an accumulator 7 and a constant-pressure pump 5, wherein an oil outlet of the accumulator 7 is connected to the rod chambers or non-rod chambers of the first oscillating cylinder 11 and the second oscillating cylinder 12, the non-rod chambers in the embodiment, to provide driving pressure for the oscillating cylinders; and an oil outlet of the constant-pressure pump 5 is connected with the oil inlet of the accumulator 7 to provide hydraulic oil for the accumulator 7.

[0028] Preferably, a second oil controlled reversing valve 10 is provided between the accumulator 7 and the first oscillating cylinder 11 and the second oscillating cylinder 12. A main oil inlet of the second oil controlled reversing valve 10 is connected with the oil outlet of the accumulator 7, a first working oil port thereof is connected with the non-rod chamber of the first oscillating cylinder 11, and a second working oil port thereof is connected with the non-rod chamber of the second oscillating cylinder 12. Thus, the accumulator can drive the piston rod of the first oscillating cylinder 11 to extend and the piston rod of the second oscillating cylinder 12 to retract at the same time, or the piston rod of the first oscillating cylinder 11 to retract and the piston rod of the second oscillating

cylinder 12 to extend at the same time, so as to drive the S-shaped distribution valve 17 to oscillate.

[0029] In addition, preferably, as shown in Figs. 2 and 4, the concrete cylinders include a first concrete cylinder 20 and a second concrete cylinder 21; and the concrete cylinder hydraulic circuit further includes a main oil pump 4, a first main cylinder 13, a second main cylinder 14 and a first oil controlled reversing valve 3. The piston rods of the first second main cylinder 13 and the second main cylinder 14 are connected to the first concrete cylinder 20 and the second concrete cylinder 21 respectively. A main oil inlet of the first oil controlled reversing valve 3 is connected with an oil outlet of the main oil pump 4, a first working oil port thereof is connected with the rod chamber of the first main cylinder 13, and a second working oil port thereof is connected with the rod chamber of the second main cylinder 14. Thus, the main oil pump 4 can drive the piston rods of the first cylinder 13 and the second main cylinder 14 to move oppositely so as to drive the first concrete cylinder 20 to output concrete outside and the second concrete cylinder 21 to suck concrete, or drive the first concrete cylinder 20 to suck concrete and the second concrete cylinder 21 to output concrete outside.

[0030] As shown in Fig. 4, in the embodiment, a first electromagnetic reversing valve 1 and a first small oil controlled reversing valve 2 are used for driving the first oil controlled reversing valve 3 to reverse; and similarly, a second electromagnetic reversing valve 8 and a second small oil controlled reversing valve 9 are used for driving the second oil controlled reversing valve 10 to reverse.

[0031] In the embodiment, the stirring mechanism is a stirring shaft with blades; and the stirring hydraulic circuit includes a stirring hydraulic motor 31 and a stirring oil pump 30. Wherein, an output shaft of the stirring hydraulic motor 31 is connected with the stirring shaft; and an oil outlet of the stirring oil pump 30 is connected with an oil inlet of the stirring hydraulic motor 31. Thus, the stirring shaft of the stirring mechanism could be driven to rotate, and the stirring shaft could drive the blades thereon to rotate, so the function of stirring the concrete is achieved.

[0032] In the embodiment, the oscillating hydraulic circuit includes an oscillating driving pressure control module, which adjusts the oscillation driving pressure value F of the oscillating actuator provided by the oscillating hydraulic circuit according to a first pressure value F1 and a second pressure value F2, or according to one of the first pressure value F1 and the second pressure value F2. Where, the first pressure value F1 is the oil hydraulic pressure value in the stirring hydraulic circuit, and the second pressure value F2 is the oil hydraulic pressure value in the concrete cylinder hydraulic circuit.

[0033] It can be understood that the oscillating driving pressure control module could adjust the oscillation driving pressure value F of the oscillating actuator provided by the oscillating hydraulic circuit in real time according to the first pressure value F1 and the second pressure value F2 so as to enable the oscillation driving pressure value to be proper with the condition of the concrete in real time because the first pressure value F1 and the second pressure value F2 can reflect the resistance of the S-shaped distribution valve during oscillating. Thus, the too high or too low pressure of the S-shaped distribution valve 17, which is caused by different types of concrete or other working conditions, is avoided; further, the situation that the S-shaped distribution valve 17 generates high-speed impact and noise and the inertial impact and vibration will happen to the whole structure, or the S-shaped distribution valve 17 cannot oscillate will be avoided.

[0034] Preferably, as shown in Fig. 4, in the embodiment, the driving pressure control module is a relief valve 19, which is provided in the oil circuit between the oil outlet of the constant-pressure pump 5 and the oil inlet of the accumulator 7 to adjust the pressure of the hydraulic oil output from the constant-pressure pump 5 to the accumulator 7. The working principle of the constant-pressure pump and the accumulator is as follows: the constant-pressure pump is used to provide pressure oil for the accumulator and determines the upper pressure limit of the accumulator. When the pressure of the accumulator is charged to the target value (called the pressure cutting value of the constant-pressure pump), the output flow of the constant-pressure pump decreases automatically, even to 0; at the moment, the pressure in the accumulator is equal to the pressure cutting value of the constant-pressure pump. It can be understood that, by means that the relief valve 19 adjusts the pressure of the hydraulic oil output from the constant-pressure pump 5 to the accumulator 7, it could adjust the driving pressure of the oscillating actuator (the first oscillating cylinder 11 and second oscillating cylinder 12 in the embodiment) provided by the accumulator 7, further to adjust the driving force of the S-shaped distribution valve provided by the first oscillating cylinder 11 and the second oscillating cylinder 12. Of source, the relief valve 19 is only an implementation for adjusting the pressure of the hydraulic oil output from the constant-pressure pump 5 to the accumulator 7, and in practice, various other adjusting ways could also be used, for example, an oil pumping pressure cutting value adjusting mechanism in the constant-pressure pump and so on.

[0035] More preferably, as shown in Fig. 4, in the embodiment, a stirring pressure sensor S1 is provided in the stirring hydraulic circuit, and configured to detect the oil hydraulic pressure of the stirring hydraulic circuit and obtain the first pressure value F1; and a pumping pressure sensor S2 is provided in the concrete cylinder hydraulic circuit, and configured to detect the oil hydraulic pressure value of the concrete cylinder hydraulic circuit and obtain the second pressure value F2. Specifically, it can be seen from Fig. 4 that the stirring pressure sensor S1 is provided in an oil circuit between the oil outlet of the stirring oil pump 30 and the oil inlet of the stirring hydraulic motor 31; and the pumping pressure sensor S2

is provided in an oil circuit between the oil outlet of the main oil pump 4 and the main oil inlet of the second oil controlled reversing valve 3.

[0036] In addition, preferably, the oscillation driving pressure value F could be calculated according to the following formula: F=F1*a+F2*b, where a is a first coefficient, b is a second coefficient, and both a and b are obtained by an engineering test. More preferably, the range of the first coefficient is 0.3-1, and the range of the second coefficient is 0.1-0.6.

[0037] According to another aspect of the invention, a method for adjusting a driving pressure value of an oscillating actuator provided by an oscillating hydraulic circuit in a concrete pump is provided. As shown in Fig. 5, the method includes the following steps:

[0038] S101: Receiving a first pressure value F1 and/or a second pressure value F2, where the first pressure value F1 is the oil hydraulic pressure value in a stirring hydraulic circuit, and the second pressure value F2 is the oil hydraulic pressure value in a pumping hydraulic circuit;

[0039] S102: Adjusting the driving pressure value F of the oscillating actuator provided by the oscillating hydraulic circuit according to the first pressure value F1 and/or the second pressure value F2.

[0040] Wherein, S102 includes: calculating the driving pressure value F according to the formula F=F1*a+F2*b, where a is a first coefficient, b is a second coefficient, and both a and b are obtained by an engineering test. More preferably, the range of the first coefficient is 0.3-1, and the range of the second coefficient is 0.1-0.6.

[0041] The method, according to the first pressure value F1 and the second pressure value F2, adjusts the oscillation driving pressure value F of the oscillating actuator provided by the oscillating hydraulic circuit in real time so that the oscillation driving pressure value F will stay properly in correspondence with the condition of the concrete in real time. Therefore, the too high or too low pressure of the S-shaped distribution valve 17 provided by the actuator, which is caused by different types of concrete or other working conditions, is avoided; further, the phenomena that the S-shaped distribution valve 17 generates high-speed impact and noise and the inertial impact and vibration will happen to the whole structure, or the S-shaped distribution valve 17 cannot oscillate will be avoided.

[0042] The above are only preferred embodiments of the invention and not intended to limit the invention. For those skilled in the art, various modifications and changes can be made in the invention. Any modifications, equivalent replacements, improvements and the like within the spirit and principle of the invention shall fall within the scope of protection of the invention.

Claims

1. A concrete pump, comprising:

a hopper(18) for being filled with concrete,
an S-shaped distribution valve(17) provided in the hopper(18),
an oscillating actuator connected with the S-shaped distribution valve(17) and driven by an oscillating hydraulic circuit to control the oscillation of the S-shaped distribution valve(17),
a stirring mechanism provided in the hopper(18) and driven by a stirring hydraulic circuit to stir the concrete in the hopper(18), and
concrete cylinders connected with one end of the S-shaped distribution valve(17) and driven by a concrete cylinder hydraulic circuit to output concrete outside or to suck concrete,
characterized in that
the oscillating hydraulic circuit comprises an oscillating driving pressure control module,
the oscillating driving pressure control module adjusts the oscillation driving pressure value F of the oscillating actuator provided by the oscillating hydraulic circuit according to a first pressure value F1 and/or a second pressure value F2, where the first pressure value F1 is the oil hydraulic pressure value in the stirring hydraulic circuit, and the second pressure value F2 is the oil hydraulic pressure value in the concrete cylinder hydraulic circuit.

2. The concrete pump according to claim 1, **characterized in that**
a stirring pressure sensor(S1) is provided in the stirring hydraulic circuit, and configured to detect the oil hydraulic pressure of the stirring hydraulic circuit and obtain the first pressure value F1; and
a pumping pressure sensor(S2) is provided in the concrete cylinder hydraulic circuit, and configured to detect the oil hydraulic pressure value of the concrete cylinder hydraulic circuit and obtain the second pressure value F2.

3. The concrete pump according to claim 2, **characterized in that** the oscillation driving pressure value F=F1*a+F2*b, where a is a first coefficient, and b is a second coefficient.

4. The concrete pump according to claim 3, **characterized in that** the range of the first coefficient is 0.3-1, and the range of the second coefficient is 0.1-0.6.

5. The concrete pump according to claim 1, **characterized in that**
the oscillating actuator is oscillating cylinders; and
the oscillating hydraulic circuit comprises:

an accumulator(7), an oil outlet of which is connected to the rod chambers or non-rod chambers of the oscillating cylinders to provide driving pressure for the oscillating cylinders;

a constant-pressure pump(5), an oil outlet of which is connected with an oil inlet of the accumulator(7) to provide hydraulic oil for the accumulator(7); and
the driving pressure control module, which is a relief valve(19), and is provided in an oil circuit between the oil outlet of the constant-pressure pump(5) and the oil inlet of the accumulator(7) to adjust the pressure of the hydraulic oil output from the constant-pressure pump(5) to the accumulator(7).

6. The concrete pump according to claim 5, **characterized in that**
the oscillating cylinders comprise a first oscillating cylinder(11) and a second oscillating cylinder(12); and
a second oil controlled reversing valve(10) is provided between the accumulator(7) and the first oscillating cylinder(11) and the second oscillating cylinder (12), a main oil inlet of the second oil controlled reversing valve(10) being connected with the oil outlet of the accumulator(7), a first working oil port of the second oil controlled reversing valve(10) being connected with the non-rod chamber of the first oscillating cylinder(11), and a second working oil port of the second oil controlled reversing valve(10) being connected with the non-rod chamber of the second oscillating cylinder(12).

7. The concrete pump according to claim 6, **characterized in that**
the concrete cylinders comprise a first concrete cylinder(20) and a second concrete cylinder(21); and
the concrete cylinder hydraulic circuit comprises:

a main oil pump(4),
a first main cylinder(13) and a second main cylinder(14), the piston rods of the first main cylinder(13) and the second main cylinder(14) are connected to the first concrete cylinder(20) and the second concrete cylinders(21) respectively,
a first oil controlled reversing valve(3), a main oil inlet of which is connected with an oil outlet of the main oil pump(4), a first working oil port of which is connected with the rod chamber of the first main cylinder(13), and a second working oil port of which is connected with the rod chamber of the second main cylinder(14), and
the pumping pressure sensor(S2) is provided in an oil circuit between the oil outlet of the main oil pump(4) and the main oil inlet of the first oil controlled reversing valve(3).

8. The concrete pump according to claim 1, **characterized in that** the stirring mechanism is a stirring shaft with blades; and
the stirring hydraulic circuit comprises:

a stirring hydraulic motor(31), an output shaft of which is connected with the stirring shaft,
a stirring oil pump(30), an oil outlet of which is connected with an oil inlet of the stirring hydraulic motor(31),
and the stirring pressure sensor(S1) is provided in an oil circuit between the oil outlet of the stirring oil pump(30) and the oil inlet of the stirring hydraulic motor(31).

9. A method for adjusting the driving pressure value of an oscillating actuator in a concrete pump, **characterized by** comprising:

receiving a first pressure value F1 and/or a second pressure value F2, where the first pressure value F1 is the oil hydraulic pressure value in a stirring hydraulic circuit; and the second pressure value F2 is the oil hydraulic pressure value in a pumping hydraulic circuit; and
adjusting the driving pressure value F of the oscillating actuator from the oscillating hydraulic circuit according to the first pressure value F1 and/or the second pressure value F2.

10. The method according to claim 9, **characterized in that** the step of adjusting the driving pressure value F of the oscillating actuator according to the first pressure value F1 and the second pressure value F2 comprises:

calculating the driving pressure value F according to the formula F=F1*a+F2*b,
where a is a first coefficient, b is a second coefficient, and the first coefficient and the second coefficient are measured by an engineering test.

11. The method according to claim 10, **characterized in that** the range of the first coefficient is 0.3-1, and the range of the second coefficient is 0.1-0.6.

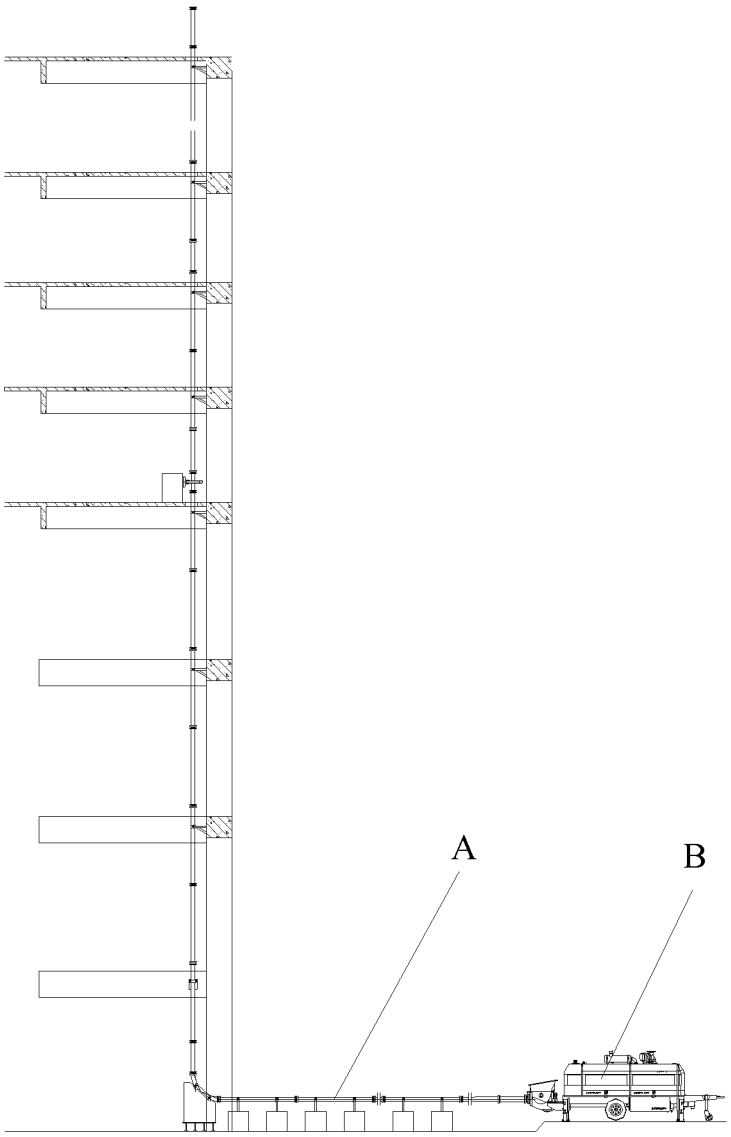

Fig. 1

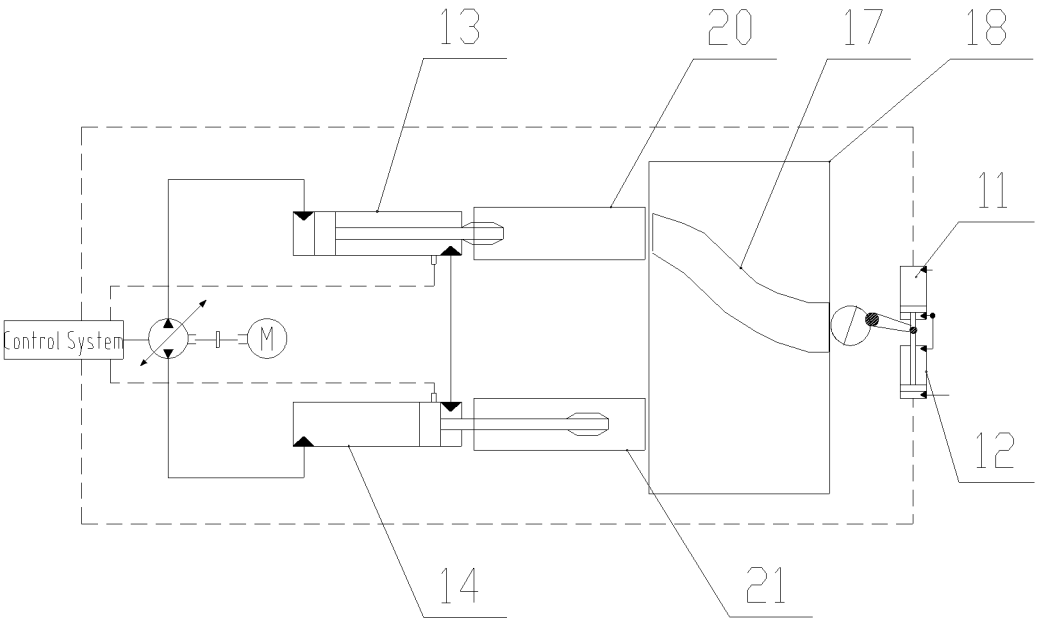

Fig. 2

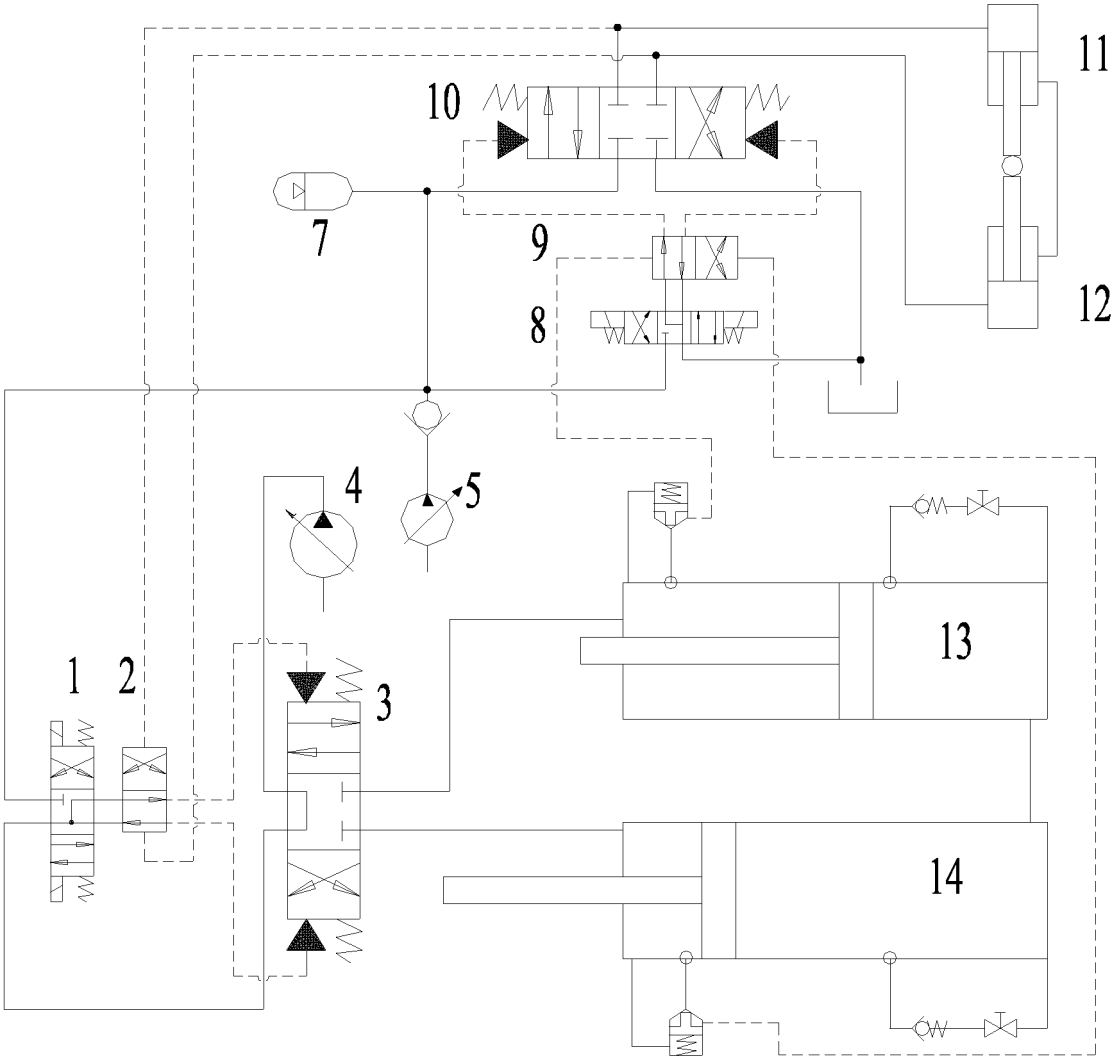

Fig. 3

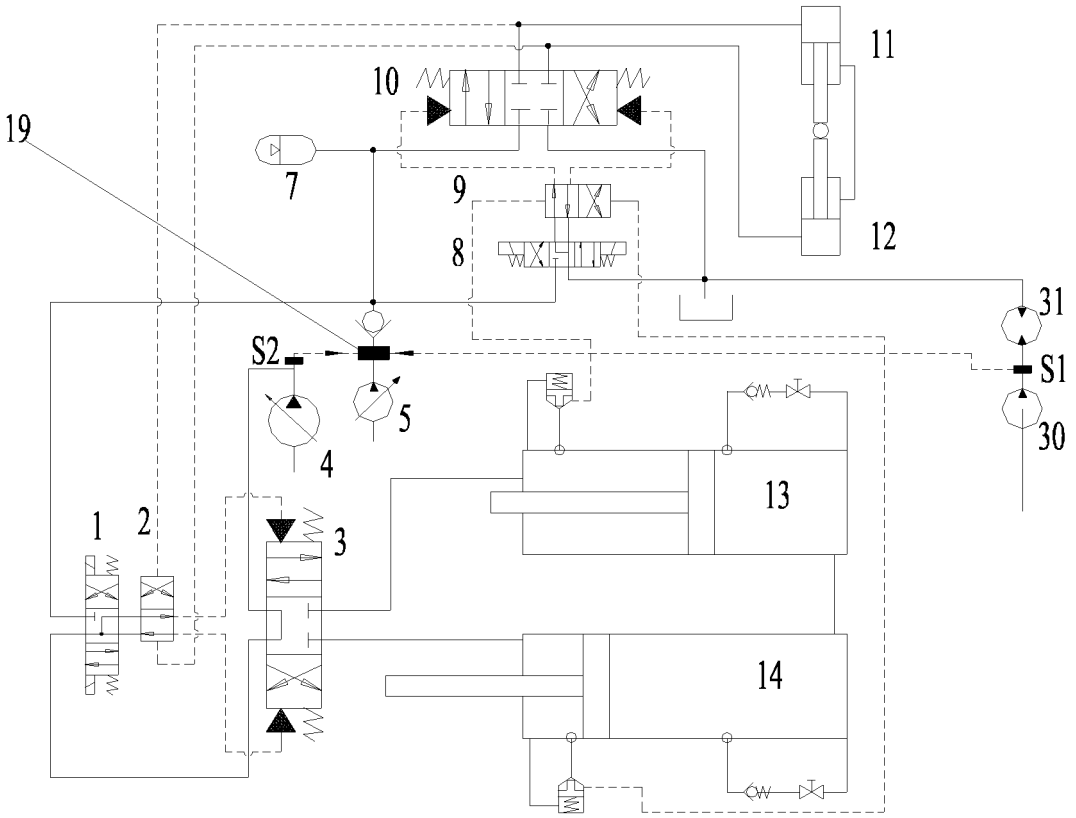
19
10
11
7
9
8
12
31
S2
S1
5
4
30
13
1
2
3
14

Fig. 4

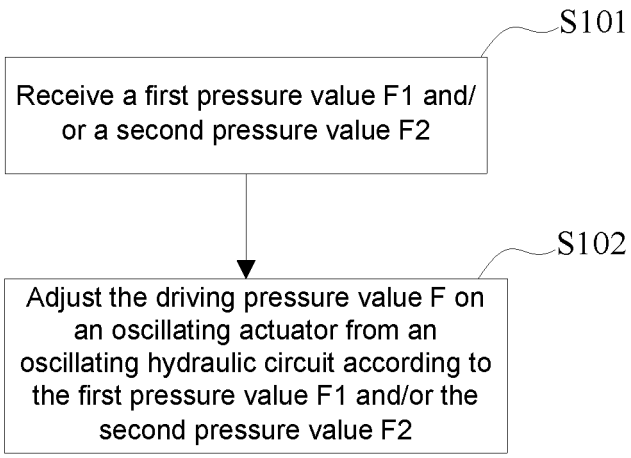
S101
Receive a first pressure value F1 and/ or a second pressure value F2
S102
Adjust the driving pressure value F on an oscillating actuator from an oscillating hydraulic circuit according to the first pressure value F1 and/or the second pressure value F2

Fig. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2011/074610

A. CLASSIFICATION OF SUBJECT MATTER

F04B 15/02(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC:F04B, B28C

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)

EPODOC, WPI, CNPAT, CNKI concrete w pump，swinging，pressure, module, stirring, hydraulic ,concrete w cylinder.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN201568245U (CHANGSHA ZHONGLIAN HEAVY IND TECHNOLOGY) 01 Sep.2010 (01.09.2010) figs.1-2, page 2,lines 8-27	1-11
A	CN2646417Y（CHANGSHA ZHONGLIAN HEAVY IND TECHNOLOGY）06 Oct.2004 （06.10.2004）the whole document	1-11
A	CN201246356Y（YANGZHOU WEIAO HEAVY IND MACHINERY CO LT）27 May 2009 （27.05.2009）the whole document	1-11
A	JP2003028054A（ISHIKAWAJIMA CONSTR MACH）29 Jan.2003（29.01.2003）the whole document	1-11

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

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 Sep.2011（12.09.2011）	**13 Oct. 2011 (13.10.2011)**
Name and mailing address of the ISA/CN The State Intellectual Property Office, the P.R.China 6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China 100088 Facsimile No. 86-10-62019451	Authorized officer LI,Jin Telephone No. (86-10)62085527

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2011/074610

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP7332232A（NIIGATA ENGINEERING CO LTD）22 Dec.1995（22.12.1995） the whole document	1-11
A	US5360321A(PUTZMEISTER MASCHF [DE]) 01 Nov.1994（01.11.1994） the whole document	1-11

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2011/074610

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
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		WO9201159 A	23.01.1992
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		JP2568342B2	08.01.1997

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