

AUTOMATIC TENSIONING CONTROL SYSTEM FOR HOISTING WIRE ROPE AND DIAPHRAGM WALL GRAB MACHINE

TECHNICAL FIELD

5 [0001] The invention belongs to the technical field of construction machinery, and more particularly, relates to an automatic tensioning control system for a hoisting wire rope and a diaphragm wall grab machine.

BACKGROUND

10 [0002] Underground diaphragm wall devices are an important underground construction trenching device. They are used to drive two bucket flaps to open and close by telescopic movement of a main push oil cylinder of the operation device thus realizing the unloading and grasping of soil. As shown in FIG. 1, in the process of grasping soil, due to an upward thrust generated by the soil layer on the bucket flaps, a hoisting wire rope of the lifting operation
15 device relaxes, causing the bucket body to incline, which cannot guarantee the trenching accuracy. At present, there is no effective correction approach to restore the operation device to a correct position.

SUMMARY

20 [0003] In order to overcome the shortcomings of the prior art, an object of the present invention is to provide an automatic tensioning control system for a hoisting wire rope and a diaphragm wall grab machine. The present invention can determine whether the operation device inclines by collecting a current tension of the wire rope, determine that the operation device inclines when the current tension is less than a preset tension, and send out a control
25 signal to enable the motor to rotationally reverse to lift the operation device until it is within a reasonable range, thereby realizing the automatic correction of the operation device.

[0004] In order to solve the problems in the prior art, the present invention provides an

automatic tensioning control system for a hoisting wire rope, including: a hoisting motor control system, which is configured to control forward and reverse rotation of a motor to realize lowering and winding of the wire rope; and an adjustment device.

5 The adjustment device is configured to send out an adjustment signal when a current wire rope tension is less than a preset tension. The hoisting motor control system is configured to control the motor to rotationally reverse after receiving the adjustment signal.

[0005] As a preferred solution, the hoisting motor control system includes:

the motor, which is provided with an oil port A and an oil port B;

a first hydraulic pump, which is provided with an oil port P1 and an oil port T1; and

10 a first control valve, which is provided with an oil port a, an oil port A', an oil port B', an oil port P and an oil port T.

The oil port A' is connected to the oil port A, the oil port B' is connected to the oil port B, the oil port P is connected to the oil port P1, and the oil port T and the oil port T1 are both connected to an oil tank.

15 After pressure oil acts on the oil port a, the oil port A' is in communication with the oil port P, the oil port B' is in communication with the oil port T, and the first hydraulic pump pumps oil to the oil port A to drive the motor to rotationally reverse. When no pressure oil acts on the oil port a, the oil port P, the oil port B', the oil port A' and the oil port T are not in communication with each other.

20 The adjustment device includes:

a second hydraulic pump, which is provided with an oil port P2 and an oil port T2;

a second control valve, which is provided with a signal input end Y1, an oil port A" and an oil port P3;

a tension detector; and

25 a controller, which is provided with a signal input end I1, a signal output end O1 and a

tension determining module.

The oil port A" is connected to the oil port a, the oil port P3 is connected to the oil port P2, and the oil port T2 is connected to the oil tank. A signal output end of the tension detector is connected to the signal input end I1 to transmit a current wire rope tension signal to the controller. The signal output end O1 is connected to the signal input end Y1.

The tension determining module is configured to send out a current signal after determining that the current wire rope tension is less than the preset tension. After the current signal is input into the signal input end Y1, the oil port A" is in communication with the oil port P3, and the second control valve outputs the pressure oil to act on the oil port a. When no signal is input into the signal input end Y1, the oil port A" is not in communication with the oil port P3, and the second control valve does not output the pressure oil.

[0006] As a preferred solution, the hoisting motor control system further includes:

a hydraulic control handle, which is provided with an operation input portion N2, an oil port P4 and an oil port C2; and

a second shuttle valve, which is provided with an oil port a', an oil port b' and an oil port c'.

The oil port P4 is connected to the oil port P2, the oil port C2 is connected to the oil port b', the oil port A" is connected to the oil port a', the oil port c' is connected to the oil port a, and the oil port T2 is connected to the oil tank.

After the operation input portion N2 is operated, the oil port P4 is in communication with the oil port C2, and the hydraulic control handle outputs the pressure oil to act on the oil port a. When the operation input portion N2 is not operated, the oil port P4 is not in communication with the oil port C2, and the hydraulic control handle does not output the pressure oil.

[0007] As a preferred solution, the hydraulic control handle is further provided with an operation input portion N1 and an oil port C1. The first control valve is further provided with an oil port b.

When the first control valve is provided with the oil port b, the oil port C1 is connected to the oil port b. After the pressure oil acts on the oil port b, the oil port A' is in communication with the oil port T, the oil port B' is in communication with the oil port P, and the first hydraulic pump pumps the oil to the oil port B to drive the motor to rotate forward.

- 5 After the operation input portion N1 is operated, the oil port P4 is in communication with the oil port C1, and the hydraulic control handle outputs the pressure oil to act on the oil port b. When the operation input portion N2 is not operated, the hydraulic control handle does not output the pressure oil.

[0008] As a preferred solution, the hoisting motor control system further includes:

- 10 a first shuttle valve, which is provided with an oil port a", an oil port b" and an oil port c";
and

a pressure switch, which is provided with a detection port.

- The controller is further provided with a signal input end I2, and the signal input end I2 is connected to a signal output end of the pressure switch. The oil port a" is connected to the oil
15 port C2, the oil port b" is connected to the oil port C1, and the oil port c" is connected to the detection port.

[0009] As a preferred solution, the hoisting motor control system includes:

the motor, which is provided with an oil port A and an oil port B;

a first hydraulic pump, which is provided with an oil port P1 and an oil port T1; and

- 20 a first control valve, which is provided with a signal input end I2, an oil port A', an oil port B', an oil port P and an oil port T.

The oil port A' is connected to the oil port A, the oil port B' is connected to the oil port B, the oil port P is connected to the oil port P1, and the oil port T and the oil port T1 are both connected to an oil tank.

- 25 After a signal is input into the signal input end I2, the oil port A' is in communication with the oil port P, the oil port B' is in communication with the oil port T, and the first hydraulic

pump pumps oil to the oil port A to drive the motor to rotationally reverse. When no signal is input into the signal input end I2, the oil port P, the oil port B', the oil port A' and the oil port T are not in communication with each other.

The adjustment device includes:

5 a tension detector; and

a controller, which is provided with a signal input end I1, a signal output end O1 and a tension determining module.

The signal output end O1 is connected to the signal input end I2. A signal output end of the tension detector is connected to the signal input end I1 to transmit a current wire rope
10 tension signal to the controller.

The tension determining module is configured to send out a current signal to the signal input end I2 after determining that the current wire rope tension is less than the preset tension.

[0010] As a preferred solution, the controller is further provided with a signal output end O2. The first control valve is further provided with a signal input end I3. The signal output end
15 O2 is connected to the signal input end I3. After a forward rotation signal sent out by the controller is input into the signal input end I3, the oil port A' is in communication with the oil port T, and the oil port B' is in communication with the oil port P. The first hydraulic pump pumps the oil to the oil port B to drive the motor to rotate forward.

[0011] As a preferred solution, the controller further includes a safety condition
20 determining module. The safety condition determining module is configured to collect a current working condition and send out a control signal to enable the tension determining module to work when a safety condition is satisfied.

[0012] The present invention further provides a diaphragm wall grab machine, including the aforementioned automatic tensioning control system for the hoisting wire rope.

25 [0013] The present invention has the following advantages. The present invention can determine whether the operation device inclines by collecting a current tension of the wire rope,

determine that the operation device inclines when the current tension is less than a preset tension, and send out a control signal to enable the motor to rotationally reverse to lift the operation device until it is within a reasonable range, thereby realizing the automatic correction of the operation device and guaranteeing trenching accuracy. The correction process may be controlled either manually or automatically, which improves the reliability of the system, reduces the labor intensity and skill requirements.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] FIG. 1 is a construction state diagram of the present invention;

FIG. 2 is a control system diagram according to Embodiment I of the present invention;

FIG. 3 is a control system diagram according to Embodiment II of the present invention;

FIG. 4 is a control system diagram according to Embodiment III of the present invention;

FIG. 5 is a system flow diagram of the present invention; and

FIG. 6 is a curve diagram of a relationship between a control current of a signal input end

Y1 and a tension difference of a wire rope according to the present invention.

[0015] In the figures:

1-motor; 2-first control valve; 3-second shuttle valve; 4-first hydraulic pump; 5-hydraulic control handle; 6-pressure switch; 7-first shuttle valve; 8-second control valve; 9-second hydraulic pump; 10-controller; 11-tension detector.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0016] The present invention will be further described below with reference to the drawings. The following embodiments are only used to explain the technical solution of the present invention more clearly, and are not considered as limiting the scope of protection of the present invention.

[0017] As shown in FIG. 1, a diaphragm wall grab machine mainly includes a hoisting machine and a grab operation device. The hoisting machine is connected to the grab operation device through a wire rope, and the hoisting machine is driven by the motor 1 to lower and raise the grab operation device. When grabbing soil, the grab operation device lowers to a designated position, and at this time, the main push oil cylinder works to close a bucket flap, causing the bucket body to incline during this process, thereby causing the tension of the wire rope to change. Based on this, the present invention specifically provides an automatic tensioning control system for a hoisting wire rope to realize the correction of the bucket body inclination, thereby finally ensuring the trenching accuracy.

[0018] Embodiment I

As shown in FIG. 2, the present embodiment mainly realizes the correction of the bucket body inclination through automatic control. The control system includes a hoisting motor control system and an adjustment device. The hoisting motor control system is configured to control the forward and reverse rotation of a motor to realize the lowering and winding of the wire rope. The adjustment device is configured to send out an adjustment signal when a current wire rope tension is less than a preset tension. The hoisting motor control system is configured to control the motor to rotationally reverse after receiving the adjustment signal. The hoisting motor control system includes: the motor 1, the first hydraulic pump 4 and the first control valve 2. The adjustment device includes: the second hydraulic pump 9, the second control valve 8, the tension detector 11 and the controller 10.

[0019] The motor 1 is provided with an oil port A and an oil port B. The first hydraulic pump 4 is provided with an oil port P1 and an oil port T1. The first control valve 2 is provided with an oil port a, an oil port A', an oil port B', an oil port P and an oil port T. The second hydraulic pump 9 is provided with an oil port P2 and an oil port T2. The second control valve 8 is provided with a signal input end Y1, an oil port A" and an oil port P3. The tension detector 11 is configured to collect a current wire rope tension. The controller 10 is provided with a signal input end I1, a signal output end O1, a tension determining module, and a safety condition determining module. The safety condition determining module is configured to

collect a pressure value of the main push oil cylinder, a construction state signal, a hoisting upgrade pilot signal, a safety handle opening signal and others, respectively, then perform a logic processing according to the collected data, and finally send out a control signal to the tension determining module to enable it to work. The tension determining module determines the magnitude of the current wire rope tension and the magnitude of a preset tension value, and sends a control signal to the signal input end Y1 according to a result of determination.

[0020] The oil port A' is connected to the oil port A, and the oil port B' is connected to the oil port B. The oil port P is connected to the oil port P1, and the oil port T and the oil port T1 are both connected to an oil tank. The oil port A" is connected to the oil port a, the oil port P3 is connected to the oil port P2, and the oil port T2 is connected to the oil tank. The collector 11 is connected to the signal input end I1, and the signal output end O1 is connected to the signal input end Y1.

[0021] The first control valve 2 is provided with a first position and a second position. When the first control valve 2 is in the first position, the oil port A' is in communication with the oil port P, and the oil port B' is in communication with the oil port T. When the first control valve 2 is in the second position, the oil port P, the oil port B', the oil port A' and the oil port T are not in communication with each other.

[0022] When a signal is input into the signal input end Y1, the oil port A" is in communication with the oil port P3, and the first control valve 2 is in the first position. When the signal input end Y1 loses power, the oil port A" is not in communication with the oil port P3, and the first control valve 2 is in the second position.

[0023] The working principle and process of the above control system are as follows.

As shown in FIG. 5, when the grab bucket grabs soil, the safety condition determining module in the controller 10 determines whether the current device satisfies the safety condition. If not, then the program stops and no adjustment will be made. If yes, then proceed, that is, at this time, the tension detector 11 collects the tension F_X of a current wire rope, and the tension determining module in the controller 10 calculates the tension difference ΔF between the preset pressure F_0 of the current wire rope and the current tension F_X . If $\Delta F \leq 0$, then the program is

terminated. If $\Delta F > 0$, then the controller 10 outputs a control current to the signal input end Y1, and at this time, the second control valve 8 is opened to work. The pressure oil pumped by the second hydraulic pump 9 enters the oil port a of the first control valve 2 through the second control valve 8, so as to enable the first control valve 2 to be in the first position. At this time, 5 the oil port A' is in communication with the oil port P, and the oil port B' is in communication with the oil port T. The pressure oil pumped by the first hydraulic pump 4 enters the oil port A of the motor 1 through the first control valve 2, and then returns to the oil tank through the oil port B. This process enables the motor 1 to work to drive the bucket body to rise. The wire rope tension increases until $\Delta F \leq 0$, and at this time, the first control valve 2 returns to the second 10 position. Such process continuously circulates to realize automatic correction of the bucket body.

[0024] The safety condition includes: whether the grab machine is in the construction mode, whether the bucket flap is closing, whether the hoisting system has a lifting pilot signal, and whether the safety handle is open. The above information data is collected through different 15 collection ports, and is determined by the safety condition determining module in the controller 10. The safety condition is satisfied only when those states are satisfied simultaneously, that is, the device is in the construction mode, the bucket flap is closing, the hoisting has no lifting pilot signal, and the safety handle is open, otherwise the safety condition is not satisfied.

[0025] As a supplementary example of Embodiment I, the first control valve 2 is further 20 provided with a signal input end I3, and the controller 10 is provided with a signal output end O2. The signal output end O2 is electrically connected to the signal input end I3, and the signal output end O2 sends out a signal to energize the signal input end I3 to control the first control valve 2 to be in a third position. At this time, the oil port A' is in communication with the oil port T, and the oil port B' is in communication with the oil port P, while the motor 1 rotates 25 forward.

[0026] In the present embodiment, a control mode of the first control valve 2 is electro-hydraulic hybrid control. The control signal includes the pressure of the pressure oil pumped by the second hydraulic pump 9 and the electrical signal sent out by the controller 10. The

second control valve 8 is a proportional valve and is further provided with an oil port T3. The oil port T3 is connected to the oil tank for oil return. As shown in FIG. 6, the proportional valve is configured to control the magnitude of the pressure oil according to the magnitude of the current. The control current I_X is proportional to the tension difference ΔF , and the control
5 current I_X of the proportional valve increases as the tension difference ΔF increases.

[0027] Embodiment II

As shown in FIG. 3, as different from Embodiment I, in this embodiment, the forward and reverse rotation of the motor 1 can also be achieved by manual control. The hoisting motor control system further includes the hydraulic control handle 5 and the second shuttle valve 3.

10 [0028] The hydraulic control handle 5 is provided with an operation input portion N2, an oil port P4 and an oil port C2. The second shuttle valve 3 is provided with an oil port a', an oil port b' and an oil port c'. The oil port P4 is connected to the oil port P2, and the oil port C2 is connected to the oil port b'. The oil port A" is connected to the oil port a', and the oil port c' is connected to the oil port a. The oil port T2 is connected to the oil tank.

15 [0029] When the operation input portion N2 is operated, the oil port P4 is in communication with the oil port C2, and the first control valve 2 is in a first position. When the operation input portion N2 is not operated, the oil port P4 is not in communication with the oil port C2, and the first control valve 2 is in a second position. When a signal is input into the signal input end Y1, the oil port A" is in communication with the oil port P3, and the first
20 control valve 2 is in the first position. When the signal input end Y1 loses power, the oil port A" is not in communication with the oil port P3, and the first control valve 2 is in the second position.

[0030] The control method in this embodiment is the same as that in Embodiment I, which will not be repeated herein.

25 [0031] As a preferred example of Embodiment II, the hydraulic control handle 5 serves as a pilot oil source, and thus is further provided with an oil port T4. The oil port T4 is connected to the oil tank to realize oil return.

[0032] As a supplementary example of Embodiment II, the hydraulic control handle 5 is further provided with an operation input portion N1 and an oil port C1. The first control valve 2 is further provided with an oil port b. The oil port C1 is connected to the oil port b. The first control valve 2 is further provided with a third position. When the first control valve 2 is in the third position, the oil port A' is in communication with the oil port T, and the oil port B' is in communication with the oil port P. When the operation input portion N1 is operated, the oil port P4 is in communication with the oil port C1, and the first control valve 2 is in the third position. When the operation input portion N2 is not operated, the oil port P4 is not in communication with the oil port C2, and the first control valve 2 is in the second position. Through the above control, the manual control of the rising and lowering processes of the bucket body can be completely realized.

[0033] As a preferred example of Embodiment II, the hoisting motor control system further includes the first shuttle valve 7 and the pressure switch 7. The first shuttle valve 7 is provided with an oil port a", an oil port b", and an oil port c". The pressure switch 7 is provided with a detection port. The controller 10 is further provided with a signal input end I2, and the signal input end I2 is connected to a signal output end of the pressure switch 7. The oil port a" is connected to the oil port C2, the oil port b" is connected to the oil port C1, and the oil port c" is connected to the detection port. A pilot pressure is detected by the pressure switch 7, so as to realize the collection and determination of the safety condition that whether the hoisting system has a lifting pilot signal. The hydraulic control handle 5 is a hydraulic handle controller, and the operation input portion N1 and the operation input portion N2 both are different operation handles.

[0034] In the same manner as in Embodiment I, the control mode of the first control valve 2 is still hydraulic control.

[0035] Embodiment III

As shown in FIG. 4, as different from Embodiment I, in this embodiment, the hoisting motor control system includes the motor 1, the first hydraulic pump 4, and the first control valve 2. The adjustment device includes the tension detector 11 and the controller 10. The

motor 1 is provided with an oil port A and an oil port B. The first hydraulic pump 4 is provided with an oil port P1 and an oil port T1. The first control valve 2 is provided with a signal input end I2, an oil port A', an oil port B', an oil port P and an oil port T. The tension detector 11 is configured to collect a wire rope tension. The controller 10 is provided with a signal input end I1, a signal output end O1, a tension determining module, and a safety condition determining module.

[0036] The oil port A' is connected to the oil port A, and the oil port B' is connected to the oil port B. The oil port P is connected to the oil port P1, and the oil port T and the oil port T1 are both connected to an oil tank. The first control valve 2 is provided with a first position and a second position. When the first control valve 2 is in the first position, the oil port A' is in communication with the oil port P, and the oil port B' is in communication with the oil port T. When the first control valve 2 is in the second position, the oil port P, the oil port B', the oil port A' and the oil port T are not in communication with each other.

[0037] The signal output end O1 is connected to the signal input end I2. The tension detector 11 is connected to the signal input end I1. After a tension signal is input into the signal input end I1, the tension determining module in the controller 10 determines the magnitude of the current tension and the magnitude of a preset tension. When the current tension is less than the preset tension, the signal output end O1 sends out a control signal to the signal input end I2, and the first control valve 2 is in the first position at this time; otherwise, the signal input end I2 has no signal input, and the first control valve 2 is in the second position. Accordingly, the first control valve 2 is an electronic control valve, which reverses through an electrical signal directly to realize the hoisting control of the bucket body.

[0038] As a supplementary example of Embodiment III, the controller 10 is further provided with a signal output end O2. The first control valve 2 is further provided with a signal input end I3. The signal output end O2 is connected to the signal input end I3. The first control valve 2 is further provided with a third position. When the first control valve 2 is in the third position, the oil port A' is in communication with the oil port T, and the oil port B' is in communication with the oil port P. After a forward rotation signal is input into the signal input

end 11, the first control valve 2 is in the third position, and at this time, the motor 1 rotates forward to lower the operation device.

[0039] In this embodiment, the control mode of the first control valve 2 is electric control, and the control signal of the first control valve 2 is an electric signal sent out by the controller

5 10.

[0040] The above only describes preferred embodiments of the present invention. It should be noted that several improvements and modifications may also be made by those having ordinary skill in the art without departing from the technical principles of the present invention, and these improvements and modifications shall fall within the scope of protection of the

10 present invention.

CLAIMS

What is claimed is:

1. An automatic tensioning control system for a hoisting wire rope, comprising:

a hoisting motor control system, wherein the hoisting motor control system is configured
5 to control forward and reverse rotation of a motor (1) to realize lowering and winding of the
wire rope; and

an adjustment device, wherein the adjustment device is configured to send out an
adjustment signal when a current wire rope tension is less than a preset tension; and the hoisting
motor control system is configured to control the motor (1) to rotationally reverse after
10 receiving the adjustment signal.

2. The automatic tensioning control system for the hoisting wire rope according to claim
1, wherein

the hoisting motor control system comprises:

15 the motor (1), wherein the motor (1) is provided with an oil port A and an oil port B;

a first hydraulic pump (4), wherein the first hydraulic pump (4) is provided with an oil
port P1 and an oil port T1; and

a first control valve (2), wherein the first control valve (2) is provided with an oil port a,
an oil port A', an oil port B', an oil port P and an oil port T;

20 wherein the oil port A' is connected to the oil port A, the oil port B' is connected to the oil
port B, the oil port P is connected to the oil port P1, and the oil port T and the oil port T1 are
both connected to an oil tank;

after a pressure oil acts on the oil port a, the oil port A' is in communication with the oil
port P, the oil port B' is in communication with the oil port T, and the first hydraulic pump (4)
25 pumps an oil to the oil port A to drive the motor (1) to rotationally reverse; when no pressure

oil acts on the oil port a, the oil port P, the oil port B', the oil port A' and the oil port T are not in communication with each other;

the adjustment device comprises:

5 a second hydraulic pump (9), wherein the second hydraulic pump (9) is provided with an oil port P2 and an oil port T2;

a second control valve (8), wherein the second control valve (8) is provided with a signal input end Y1, an oil port A" and an oil port P3;

a tension detector (11); and

10 a controller (10), wherein the controller (10) is provided with a signal input end I1, a signal output end O1 and a tension determining module;

wherein the oil port A" is connected to the oil port a, the oil port P3 is connected to the oil port P2, and the oil port T2 is connected to the oil tank; a signal output end of the tension detector (11) is connected to the signal input end I1 to transmit a current wire rope tension signal to the controller (10), and the signal output end O1 is connected to the signal input end
15 Y1;

wherein the tension determining module is configured to send out a current signal after determining that the current wire rope tension is less than the preset tension; after the current signal is input into the signal input end Y1, the oil port A" is in communication with the oil port P3, and the second control valve (8) outputs the pressure oil to act on the oil port a; when no
20 signal is input into the signal input end Y1, the oil port A" is not in communication with the oil port P3, and the second control valve (8) does not output the pressure oil.

3. The automatic tensioning control system for the hoisting wire rope according to claim 2, wherein

25 the hoisting motor control system further comprises:

a hydraulic control handle (5), wherein the hydraulic control handle (5) is provided with

an operation input portion N2, an oil port P4 and an oil port C2; and

a second shuttle valve (3), wherein the second shuttle valve (3) is provided with an oil port a', an oil port b' and an oil port c';

wherein the oil port P4 is connected to the oil port P2, the oil port C2 is connected to the oil port b', the oil port A" is connected to the oil port a', the oil port c' is connected to the oil port a, and the oil port T2 is connected to the oil tank;

after the operation input portion N2 is operated, the oil port P4 is in communication with the oil port C2, and the hydraulic control handle (5) outputs the pressure oil to act on the oil port a; and when the operation input portion N2 is not operated, the oil port P4 is not in communication with the oil port C2, and the hydraulic control handle (5) does not output the pressure oil.

4. The automatic tensioning control system for the hoisting wire rope according to claim 3, wherein

the hydraulic control handle (5) is further provided with an operation input portion N1 and an oil port C1; the first control valve (2) is further provided with an oil port b;

when the first control valve (2) is provided with the oil port b, the oil port C1 is connected to the oil port b; after the pressure oil acts on the oil port b, the oil port A' is in communication with the oil port T, the oil port B' is in communication with the oil port P, and the first hydraulic pump (4) pumps the oil to the oil port B to drive the motor (1) to rotate forward;

after the operation input portion N1 is operated, the oil port P4 is in communication with the oil port C1, and the hydraulic control handle (5) outputs the pressure oil to act on the oil port b; and when the operation input portion N2 is not operated, the hydraulic control handle (5) does not output the pressure oil.

5. The automatic tensioning control system for the hoisting wire rope according to claim

4, wherein

the hoisting motor control system further comprises:

a first shuttle valve (7), wherein the first shuttle valve (7) is provided with an oil port a", an oil port b" and an oil port c"; and

5 a pressure switch (7), wherein the pressure switch (7) is provided with a detection port;

wherein the controller (10) is further provided with a signal input end I2, and the signal input end I2 is connected to a signal output end of the pressure switch (7); the oil port a" is connected to the oil port C2, the oil port b" is connected to the oil port C1, and the oil port c" is connected to the detection port.

10

6. The automatic tensioning control system for the hoisting wire rope according to claim 1, wherein

the hoisting motor control system comprises:

the motor (1), wherein the motor (1) is provided with an oil port A and an oil port B;

15 a first hydraulic pump (4), wherein the first hydraulic pump (4) is provided with an oil port P1 and an oil port T1; and

a first control valve (2), wherein the first control valve (2) is provided with a signal input end I2, an oil port A', an oil port B', an oil port P and an oil port T;

20 wherein the oil port A' is connected to the oil port A, the oil port B' is connected to the oil port B, the oil port P is connected to the oil port P1, and the oil port T and the oil port T1 are both connected to an oil tank;

25 after a signal is input into the signal input end I2, the oil port A' is in communication with the oil port P, the oil port B' is in communication with the oil port T, and the first hydraulic pump (4) pumps an oil to the oil port A to drive the motor (1) to rotationally reverse; when no signal is input into the signal input end I2, the oil port P, the oil port B', the oil port A' and the

oil port T are not in communication with each other;

the adjustment device comprises:

a tension detector (11); and

a controller (10), wherein the controller (10) is provided with a signal input end I1, a signal
5 output end O1 and a tension determining module;

wherein the signal output end O1 is connected to the signal input end I2; a signal output
end of the tension detector (11) is connected to the signal input end I1 to transmit a current wire
rope tension signal to the controller (10); and

the tension determining module is configured to send out a current signal to the signal
10 input end I2 after determining that the current wire rope tension is less than the preset tension.

7. The automatic tensioning control system for the hoisting wire rope according to claim
6, wherein

the controller (10) is further provided with a signal output end O2; the first control valve
15 (2) is further provided with a signal input end I3; the signal output end O2 is connected to the
signal input end I3; after a forward rotation signal sent out by the controller (10) is input into
the signal input end I3, the oil port A' is in communication with the oil port T, and the oil port
B' is in communication with the oil port P; and the first hydraulic pump (4) pumps the oil to
the oil port B to drive the motor (1) to rotate forward.

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8. The automatic tensioning control system for the hoisting wire rope according to any
one of claims 2-7, wherein

the controller (10) further comprises a safety condition determining module, wherein the
safety condition determining module is configured to collect a current working condition and
25 send out a control signal to enable the tension determining module to work when a safety
condition is satisfied.

9. A diaphragm wall grab machine, comprising the automatic tensioning control system for the hoisting wire rope according to claim 1.