

HYDRAULIC TRANSMISSION BOX CONTROL SYSTEM FOR OIL-CHARGE BRAKING OF REVERSE PART OF TORQUE CONVERTER

Technical Field

The present invention relates to a technical field of hydraulic transmission boxes, and particularly to a hydraulic transmission box control system for oil-charge braking of a reverse part of a torque converter.

Background Art

At present, oil-charge reverse braking of a torque converter has already been applied on locomotives. That is, when a vehicle is traveling in a forward (B-direction) or reverse (A-direction) direction, a driver directly places a reversing handle at an opposite position. At this time, a starting torque converter produces a turbine reverse rotation phenomenon, which is referred to as oil-charge reverse braking; at this time, the entire torque converter is fully filled with oil. In particular, in a centrifugal-turbine torque converter, the braking torque increases rapidly.

Currently, a method of adjusting engine speed is adopted to adjust braking torque. However, because the braking torque is not very sensitive to changes in engine speed, it is difficult for the driver to control, and with slight carelessness the braking torque becomes large,

causing a transmission system to be overloaded, which is very unfavorable to driving safety. If the braking force is not controlled and is applied directly, the following problems occur: (1) the braking force is too large, causing damage to components of the transmission system; (2) the heat exchanger of the torque converter has insufficient capacity, making heat dissipation difficult; and (3) the braking force is not easy to control, producing braking shock.

Summary of Invention

The present invention provides a hydraulic transmission box control system for oil-charge braking of a reverse part of a torque converter so as to overcome the above technical problems.

To achieve the above object, the technical solution of the present invention is as follows.

A hydraulic transmission box control system for oil-charge braking of a reverse part of a torque converter includes: an air source module; an electronic control valve module; a cooling unit; a hydraulic unit of a hydraulic transmission box; an oil supply unit; and a hydraulic control unit, wherein

the electronic control valve module is connected to the air source module used for providing a compressed air medium, the hydraulic control unit is connected to the electronic control valve module to acquire

a traction/braking signal of the hydraulic transmission box, the hydraulic control unit includes a two-position three-way valve, a first main control valve, and a second main control valve which are respectively connected to the electronic control valve module, a valve control oil inlet of the two-position three-way valve is connected to a control pump for providing control oil to the hydraulic unit and the cooling unit,

the oil supply unit is respectively connected to the hydraulic unit and the cooling unit, and the oil supply unit is used for providing transmission oil to the hydraulic unit,

the hydraulic unit is connected to the hydraulic control unit, and the hydraulic unit is used for implementing an oil-charge/oil-discharge operation of the hydraulic transmission box based on the traction/braking signal of the hydraulic transmission box,

the cooling unit includes a traction heat exchanger, a three-way transfer valve, and a braking heat exchanger which are connected in sequence, and the cooling unit is used for performing a cooling operation on the hydraulic unit.

Further, the hydraulic unit includes an A-direction torque converter, a B-direction torque converter, a first drainage valve, and a second drainage valve,

an oil inlet a3 of the A-direction torque converter

is connected to a transmission oil outlet c1 of the first main control valve, an oil discharge outlet a2 of the A-direction torque converter is connected to a transmission oil inlet c3 of the first main control valve, a drain port a1 of the A-direction torque converter is connected to a transmission oil inlet a2 of the first drainage valve, an oil inlet b3 of the B-direction torque converter is connected to a transmission oil outlet b1 of the second main control valve,

an oil discharge outlet b2 of the B-direction torque converter is connected to a transmission oil inlet b3 of the second main control valve, a drain port b1 of the B-direction torque converter is connected to a transmission oil inlet b2 of the second drainage valve, an oil-drain channel a3 of the first drainage valve and an oil-drain channel b3 of the second drainage valve are in fluid communication, via an internal pipeline of the hydraulic transmission box, with the oil supply unit, a control oil inlet a1 of the first drainage valve and a control oil inlet b1 of the second drainage valve are connected to a control oil inlet a3 of the three-way transfer valve, and the control oil inlet a3 of the three-way transfer valve is further connected to the two-position three-way valve.

Further, the oil supply unit includes an oil supply pump and an oil sump,

the oil supply pump is connected to a transmission oil inlet c1 of the traction heat exchanger, a transmission oil outlet c2 of the traction heat exchanger is connected to a transmission oil inlet a1 of the three-way transfer valve, a transmission oil outlet a2 of the three-way transfer valve is connected to a transmission oil inlet b1 of the braking heat exchanger, and a transmission oil outlet b2 of the braking heat exchanger is respectively connected to a transmission oil inlet c2 of the first main control valve and to a transmission oil inlet b2 of the second main control valve.

Further, the two-position three-way valve includes a valve air source inlet, a valve control oil inlet, and a valve control oil outlet,

an outlet a1 of the control pump is connected to the valve control oil inlet, the valve air source inlet is connected to the electronic control valve module, and the valve control oil outlet is connected to a control oil inlet of the three-way transfer valve.

Further, a method by which the hydraulic unit implements an oil-charge/oil-discharge operation of the hydraulic transmission box based on a traction/braking signal of the hydraulic transmission box includes:

S1: first, setting the A-direction torque converter as a traction torque converter, setting the B-direction

torque converter as a reverse torque converter,

turning on the control pump, starting the first main control valve via the electronic control valve module so that a valve spool of the first main control valve descends; and the two-position three-way valve is in a reset state, with the valve control oil inlet and the valve control oil outlet being in fluid communication,

by the control pump, drawing control oil from the oil supply unit and delivering the control oil to the first drainage valve and the second drainage valve to maintain the first drainage valve and the second drainage valve in a reset state, and driving the three-way transfer valve by the control oil to isolate the traction heat exchanger from the braking heat exchanger;

S2: by the oil supply pump, driving transmission oil in the oil sump to flow through the traction heat exchanger, then delivering the transmission oil to the first main control valve, and driving the first main control valve via the electronic control valve module to deliver the transmission oil to the A-direction torque converter to implement an oil-charge operation;

S3: when a braking operation is required, placing a direction handle of a locomotive at a reverse position, disconnecting the first main control valve via the electronic control valve module to discharge the transmission oil in

the A-direction torque converter, via the first main control valve, to the oil supply unit, and turning on the second main control valve and the two-position three-way valve,

compressed air in the air source module entering the second main control valve via the electronic control valve module, driving a valve spool of the second main control valve to descend, meanwhile, a valve spool of the two-position three-way valve moving toward one end of the two-position three-way valve, a control oil outlet a1 of the control pump being isolated from the valve control oil inlet of the two-position three-way valve, and the valve control oil outlet being in fluid communication with an oil-sump return outlet of the oil supply unit, thereby discharging all the control oil remaining in the two-position three-way valve, the three-way transfer valve, the first drainage valve, and the second drainage valve;

S4: since the control oil in the control oil inlet a3 of the three-way transfer valve is discharged, the three-way transfer valve resetting, and the transmission oil inlet a1 of the three-way transfer valve being in fluid communication with the transmission oil outlet a2 of the three-way transfer valve, thereby causing the traction heat exchanger to be in fluid communication with the braking heat exchanger,

the oil supply pump of the oil supply unit drawing the transmission oil from the oil sump, the transmission oil

sequentially flowing through the traction heat exchanger and the braking heat exchanger and then reaching the second main control valve, descent of the valve spool of the second main control valve causing the transmission oil outlet b1 of the second main control valve to be in fluid communication with the transmission oil inlet b2 of the second main control valve,

the transmission oil outlet b2 of the braking heat exchanger being in fluid communication with the transmission oil inlet b2 of the second main control valve, and the transmission oil outlet b1 of the second main control valve being in fluid communication with a transmission oil inlet b3 of the B-direction torque converter, thereby causing the transmission oil to enter the B-direction torque converter and starting an oil-charge operation; and

S5: the drain port b1 of the B-direction torque converter being in fluid communication with the transmission oil inlet b2 of the second drainage valve, the transmission oil in the B-direction torque converter entering the second drainage valve and pushing a valve spool of the second drainage valve to move toward one end of the second drainage valve, thereby causing the transmission oil inlet b2 of the second drainage valve to be in fluid communication with the oil-drain channel b3 of the second drainage valve,

a portion of the transmission oil in the B-direction

torque converter being discharged into the oil sump of the oil supply unit to implement an operation of partial-oil-charge reverse braking of the hydraulic transmission box.

Advantageous Effects of Invention

The present invention discloses a hydraulic transmission box control system for oil-charge braking of a reverse part of a torque converter. By providing a two-position three-way valve and a hydraulic unit in the control system, full-oil-charge reverse braking of the hydraulic transmission box is changed into partial-oil-charge reverse braking, and a braking heat exchanger is additionally provided; a traction heat exchanger and the braking heat exchanger are used in series via a three-way transfer valve, thereby greatly enhancing heat dissipation capability during locomotive braking, solving the problems that the braking force is too large, the heat exchanger of the torque converter has insufficient capacity, and the braking force is not easy to control, making the braking performance of the locomotive hydraulic transmission box convenient to operate, and greatly improving the economical efficiency and the reliability.

Brief Description of Drawings

In order to illustrate the embodiments of the present invention or the technical solutions in the prior art more clearly, the following briefly introduces the accompanying

drawings that need to be used in the description of the embodiments or the prior art. Obviously, the accompanying drawings in the following description are some embodiments of the present invention, and for a person skilled in the art, other drawings can also be obtained from these accompanying drawings without creative effort.

FIG. 1 is a schematic diagram of a system configuration of a hydraulic transmission box control system for oil-charge braking of a reverse part of a torque converter according to the present invention.

In the drawings: 1, air source module; 2, electronic control valve module; 3, cooling unit; 31, traction heat exchanger; 32, three-way transfer valve; 33, braking heat exchanger; 4, hydraulic unit; 41, A-direction torque converter; 410, first starting torque converter; 411, first operating torque converter; 42, B-direction torque converter; 420, second starting torque converter; 421, second operating torque converter; 43, first drainage valve; 44, second drainage valve; 5, oil supply unit; 51, oil supply pump; 52, oil sump; 6, hydraulic control unit; 61, two-position three-way valve; 611, valve air source inlet; 612, valve control oil inlet; 613, valve control oil outlet; 614, third oil-sump return port; 62, first main control valve; 621, first oil-sump return port; 63, second main control valve; 631, second oil-sump return port; 64, control pump.

Description of Embodiments

In order to make the purposes, technical solutions and advantages of the embodiments of the present invention clearer, the technical solutions in the embodiments of the present invention will be clearly and completely described below with reference to the accompanying drawings in the embodiments of the present invention. Obviously, the embodiments to be described are some, but not all, embodiments of the present invention. Based on the embodiments of the present invention, all other embodiments obtained by a person skilled in the art without creative efforts are within the protection scope of the present invention.

The present embodiment provides a hydraulic transmission box control system for oil-charge braking of a reverse part of a torque converter, as illustrated in FIG. 1, the hydraulic transmission box control system including: an air source module 1; an electronic control valve module 2; a cooling unit 3; a hydraulic unit 4 of a hydraulic transmission box; an oil supply unit 5; and a hydraulic control unit 6, wherein

the electronic control valve module 2 is connected to the air source module 1 used for providing a compressed air medium, the hydraulic control unit 6 is connected to the electronic control valve module 2 to acquire a

traction/braking signal of the hydraulic transmission box, the hydraulic control unit 6 includes a two-position three-way valve 61, a first main control valve 62, and a second main control valve 63 which are respectively connected to the electronic control valve module 2, a valve control oil inlet 612 of the two-position three-way valve 61 is connected to a control pump 64 for providing control oil to the hydraulic unit 4 and the cooling unit 3,

the oil supply unit 5 is respectively connected to the hydraulic unit 4 and the cooling unit 3, and the oil supply unit 5 is used for providing transmission oil to the hydraulic unit 4,

the hydraulic unit 4 is connected to the hydraulic control unit 6, and the hydraulic unit 4 is used for implementing an oil-charge/oil-discharge operation of the hydraulic transmission box based on the traction/braking signal of the hydraulic transmission box,

the cooling unit 3 includes a traction heat exchanger 31, a three-way transfer valve 32, and a braking heat exchanger 33 which are connected in sequence, and the cooling unit 3 is used for performing a cooling operation on the hydraulic unit 4.

The present embodiment discloses a hydraulic transmission box control system for oil-charge braking of a reverse part of a torque converter. By providing a two-

position three-way valve and a hydraulic unit (an A-direction torque converter, a B-direction torque converter, a first drainage valve, and a second drainage valve) in the control system, full-oil-charge reverse braking of the hydraulic transmission box is changed into partial-oil-charge reverse braking, and a braking heat exchanger is additionally provided; a traction heat exchanger and the braking heat exchanger are used in series via a three-way transfer valve, thereby greatly enhancing heat dissipation capability during locomotive braking, solving the problems that the braking force is too large, the heat exchanger of the torque converter has insufficient capacity, and the braking force is not easy to control, making the braking performance of the locomotive hydraulic transmission box convenient to operate, and greatly improving the economical efficiency and the reliability.

In an embodiment, the hydraulic unit 4 includes an A-direction torque converter 41, a B-direction torque converter 42, a first drainage valve 43, and a second drainage valve 44, wherein the A-direction torque converter 41 includes a first starting torque converter 410 and a first operating torque converter 411, the B-direction torque converter 42 includes a second starting torque converter 420 and a second operating torque converter 421, and the principles of the respective starting torque converters and

operating torque converters are the same, except that, during oil-charging of the A-direction torque converter 41 and the B-direction torque converter 42, different gear changes are implemented due to sizes and performances of the mechanical device. The mechanical device is a well-known technology in the art and is not the inventive point of the present application, and therefore description thereof is omitted.

An oil inlet a3 of the first starting torque converter 410 of the A-direction torque converter 41 is connected to a transmission oil outlet c1 of the first main control valve 62, an oil discharge outlet a2 of the first starting torque converter 410 is connected to a transmission oil inlet c3 of the first main control valve 62, a drain port a1 of the first starting torque converter 410 is connected to a transmission oil inlet a2 of the first drainage valve 43, and an oil inlet b3 of the second starting torque converter 420 of the B-direction torque converter 42 is connected to a transmission oil outlet b1 of the second main control valve 63.

An oil discharge outlet b2 of the second starting torque converter 420 is connected to a transmission oil inlet b3 of the second main control valve 63, a drain port b1 of the second starting torque converter 420 is connected to a transmission oil inlet b2 of the second drainage valve 44, an oil-drain channel a3 of the first drainage valve 43 and an oil-drain channel b3 of the second drainage valve 44 are

in fluid communication, via an internal pipeline of the hydraulic transmission box, with the oil supply unit 5, a control oil inlet a1 of the first drainage valve 43 and a control oil inlet b1 of the second drainage valve 44 are connected to a control oil inlet a3 of the three-way transfer valve 32, and the control oil inlet a3 of the three-way transfer valve 32 is further connected to the two-position three-way valve 61.

In an embodiment, the oil supply unit 5 includes an oil supply pump 51 and an oil sump 52,

the oil supply pump 51 is connected to a transmission oil inlet c1 of the traction heat exchanger 31, a transmission oil outlet c2 of the traction heat exchanger 31 is connected to a transmission oil inlet a1 of the three-way transfer valve 32, a transmission oil outlet a2 of the three-way transfer valve 32 is connected to a transmission oil inlet b1 of the braking heat exchanger 33, and a transmission oil outlet b2 of the braking heat exchanger 33 is respectively connected to a transmission oil inlet c2 of the first main control valve 62 and to a transmission oil inlet b2 of the second main control valve 63.

In an embodiment, the two-position three-way valve 61 includes a valve air source inlet 611, a valve control oil inlet 612, and a valve control oil outlet 613,

an outlet a1 of the control pump 64 is connected to

the valve control oil inlet 612, the valve air source inlet 611 is connected to the electronic control valve module 2, and the valve control oil outlet 613 is connected to a control oil inlet a3 of the three-way transfer valve 32. By the electronic control valve module 2, an air source medium is delivered to the valve air source inlet 611 of the two-position three-way valve 61, whereby, by air pressure, a valve spool of the two-position three-way valve 61 performs reciprocating movement; by the control pump 64 via the two-position three-way valve 61, control oil is provided to the first drainage valve 43 and the second drainage valve 44 of the hydraulic unit 4 and to the cooling unit 3.

In an embodiment, a method by which the hydraulic unit 4 implements an oil-charge/oil-discharge operation of the hydraulic transmission box based on a traction/braking signal of the hydraulic transmission box includes:

according to an operating process of the locomotive, setting the A-direction torque converter 41 as a traction torque converter or a reverse torque converter, and setting the B-direction torque converter as a reverse torque converter or a traction torque converter, so as to implement, based on the traction/braking signal of the hydraulic transmission box, an oil-charge/oil-discharge operation of the hydraulic transmission box, thereby implementing partial-oil-charge reverse braking of the torque converter

of the hydraulic transmission box,

S1: first, setting the A-direction torque converter 41 as a traction torque converter, setting the B-direction torque converter 42 as a reverse torque converter,

turning on the control pump 64, starting the first main control valve 62 via an electronic control valve F4 of the electronic control valve module 2 so that a valve spool of the first main control valve 62 descends; and the two-position three-way valve 61 is in a reset state, with the valve control oil inlet 612 and the valve control oil outlet 613 being in fluid communication,

by the control pump 64, drawing control oil from the oil supply unit 5 and delivering the control oil to the first drainage valve 43 and the second drainage valve 44 to maintain the first drainage valve 43 and the second drainage valve 44 in a reset state, and driving the three-way transfer valve 32 by the control oil to isolate the traction heat exchanger 31 from the braking heat exchanger 33;

S2: by the oil supply pump 51, driving transmission oil in the oil sump 52 to flow through the traction heat exchanger 31, then delivering the transmission oil to the first main control valve 62, and driving the first main control valve 62 via the electronic control valve module 2 to deliver the transmission oil to the A-direction torque converter 41 to implement an oil-charge operation;

S3: when a braking operation is required, placing a direction handle of the locomotive at a B-direction (reverse) position; under the action of the locomotive electronic control device, disconnecting the first main control valve 62 via the electronic control valve F4 of the electronic control valve module 2, so that the transmission oil in the A-direction torque converter 41 is discharged into an oil sump of the oil supply unit 5 via a first oil-sump return port 621 of the first main control valve 62 (similarly, when the A-direction torque converter 41 is set as a reverse torque converter and the B-direction torque converter 42 is set as a traction torque converter, disconnecting the second main control valve 63 via the electronic control valve module 2, so that the transmission oil in the B-direction torque converter 42 is discharged into the oil sump of the oil supply unit 5 via a second oil-sump return port 631 of the second main control valve 63), turning on the second main control valve 63 via an electronic control valve F1 of the electronic control valve module 2, turning on the two-position three-way valve 61 via an electronic control valve F3 of the electronic control valve module 2,

compressed air in the air source module 1 entering the second main control valve 63 via the electronic control valve module 2, driving a valve spool of the second main control valve 63 to descend, meanwhile, a valve spool of the

two-position three-way valve 61 moving toward one end of the two-position three-way valve 61, a control oil outlet a1 of the control pump 64 being isolated from the valve control oil inlet 612 of the two-position three-way valve 61, and the valve control oil outlet 613 being in fluid communication with a third oil-sump return port 614, and being in fluid communication, via the third oil-sump return port 614, with an oil-sump return outlet of the oil supply unit 5, thereby discharging all the control oil remaining in the two-position three-way valve 61, the three-way transfer valve 32, the first drainage valve 43, and the second drainage valve 44;

S4: since the control oil in the control oil inlet a3 of the three-way transfer valve 32 is discharged, the three-way transfer valve 32 resetting, and the transmission oil inlet a1 of the three-way transfer valve 32 being in fluid communication with the transmission oil outlet a2 of the three-way transfer valve 32, thereby causing the traction heat exchanger 31 to be in fluid communication with the braking heat exchanger 33,

the oil supply pump 51 of the oil supply unit 5 drawing the transmission oil from the oil sump 52, the transmission oil sequentially flowing through the traction heat exchanger 31 and the braking heat exchanger 33 and then reaching the second main control valve 63, descent of the valve spool of the second main control valve 63 causing the transmission

oil outlet b1 of the second main control valve 63 to be in fluid communication with the transmission oil inlet b2 of the second main control valve 63,

the transmission oil outlet b2 of the braking heat exchanger 33 being in fluid communication with the transmission oil inlet b2 of the second main control valve 63, and the transmission oil outlet b1 of the second main control valve 63 being in fluid communication with a transmission oil inlet b3 of the B-direction torque converter 42, thereby causing the transmission oil to enter the B-direction torque converter 42 and starting an oil-charge operation, wherein when the locomotive is in traction, only the traction heat exchanger operates, during braking, the traction heat exchanger and the braking heat exchanger are used in series, thereby increasing the heat dissipation effect and effectively ensuring heat dissipation capability during locomotive braking; and

S5: the drain port b1 of the B-direction torque converter 42 being in fluid communication with the transmission oil inlet b2 of the second drainage valve 44, the transmission oil in the B-direction torque converter 42 entering the second drainage valve 44 and pushing a valve spool of the second drainage valve 44 to move toward one end of the second drainage valve 44, thereby causing the transmission oil inlet b2 of the second drainage valve 44 to

be in fluid communication with the oil-drain channel b3 of the second drainage valve 44,

a portion of the transmission oil in the B-direction torque converter 42 being discharged into the oil sump 52 of the oil supply unit 5 to implement an operation of partial-oil-charge reverse braking of the hydraulic transmission box.

Finally, it should be noted that: the above embodiments are only used to illustrate the technical solutions of the present invention, but not to limit them; although the present invention has been described in detail with reference to the foregoing embodiments, a person skilled in the art should understand that: the technical solutions described in the foregoing embodiments can still be modified, or some or all of the technical features thereof can be equivalently substituted. However, these modifications or substitutions do not make the essence of the corresponding technical solutions deviate from the scope of the technical solutions of the embodiments of the present invention.

CLAIMS

1. A hydraulic transmission box control system for oil-charge braking of a reverse part of a torque converter, the hydraulic transmission box control system comprising: an air source module (1); an electronic control valve module (2); a cooling unit (3); a hydraulic unit (4) of a hydraulic transmission box; an oil supply unit (5); and a hydraulic control unit (6), wherein

the electronic control valve module (2) is connected to the air source module (1) used for providing a compressed air medium, the hydraulic control unit (6) is connected to the electronic control valve module (2) to acquire a traction/braking signal of the hydraulic transmission box, the hydraulic control unit (6) includes a two-position three-way valve (61), a first main control valve (62), and a second main control valve (63) which are respectively connected to the electronic control valve module (2), a valve control oil inlet (612) of the two-position three-way valve (61) is connected to a control pump (64) for providing control oil to the hydraulic unit (4) and the cooling unit (3),

the oil supply unit (5) is respectively connected to the hydraulic unit (4) and the cooling unit (3), and the oil supply unit (5) is used for providing transmission oil to the hydraulic unit (4),

the hydraulic unit (4) is connected to the hydraulic

control unit (6), and the hydraulic unit (4) is used for implementing an oil-charge/oil-discharge operation of the hydraulic transmission box based on the traction/braking signal of the hydraulic transmission box,

the cooling unit (3) includes a traction heat exchanger (31), a three-way transfer valve (32), and a braking heat exchanger (33) which are connected in sequence, and the cooling unit (3) is used for performing a cooling operation on the hydraulic unit (4).

2. The hydraulic transmission box control system according to claim 1, wherein the hydraulic unit (4) includes an A-direction torque converter (41), a B-direction torque converter (42), a first drainage valve (43), and a second drainage valve (44),

an oil inlet a3 of the A-direction torque converter (41) is connected to a transmission oil outlet c1 of the first main control valve (62), an oil discharge outlet a2 of the A-direction torque converter (41) is connected to a transmission oil inlet c3 of the first main control valve (62), a drain port a1 of the A-direction torque converter (41) is connected to a transmission oil inlet a2 of the first drainage valve (43), an oil inlet b3 of the B-direction torque converter (42) is connected to a transmission oil outlet b1 of the second main control valve (63),

an oil discharge outlet b2 of the B-direction torque

converter (42) is connected to a transmission oil inlet b3 of the second main control valve (63), a drain port b1 of the B-direction torque converter (42) is connected to a transmission oil inlet b2 of the second drainage valve (44), an oil-drain channel a3 of the first drainage valve (43) and an oil-drain channel b3 of the second drainage valve (44) are in fluid communication, via an internal pipeline of the hydraulic transmission box, with the oil supply unit (5), a control oil inlet a1 of the first drainage valve (43) and a control oil inlet b1 of the second drainage valve (44) are connected to a control oil inlet a3 of the three-way transfer valve (32), and the control oil inlet a3 of the three-way transfer valve (32) is further connected to the two-position three-way valve (61).

3. The hydraulic transmission box control system according to claim 2, wherein the oil supply unit (5) includes an oil supply pump (51) and an oil sump (52),

the oil supply pump (51) is connected to a transmission oil inlet c1 of the traction heat exchanger (31), a transmission oil outlet c2 of the traction heat exchanger (31) is connected to a transmission oil inlet a1 of the three-way transfer valve (32), a transmission oil outlet a2 of the three-way transfer valve (32) is connected to a transmission oil inlet b1 of the braking heat exchanger (33), and a transmission oil outlet b2 of the braking heat

exchanger (33) is respectively connected to a transmission oil inlet c2 of the first main control valve (62) and to a transmission oil inlet b2 of the second main control valve (63).

4. The hydraulic transmission box control system according to claim 3, wherein the two-position three-way valve (61) includes a valve air source inlet (611), a valve control oil inlet (612), and a valve control oil outlet (613),

an outlet a1 of the control pump (64) is connected to the valve control oil inlet (612), the valve air source inlet (611) is connected to the electronic control valve module (2), and the valve control oil outlet (613) is connected to a control oil inlet a3 of the three-way transfer valve (32).

5. The hydraulic transmission box control system according to claim 4, wherein a method by which the hydraulic unit (4) implements an oil-charge/oil-discharge operation of the hydraulic transmission box based on a traction/braking signal of the hydraulic transmission box includes:

S1: first, setting the A-direction torque converter (41) as a traction torque converter, setting the B-direction torque converter (42) as a reverse torque converter,

turning on the control pump (64), starting the first main control valve (62) via the electronic control valve module (2) so that a valve spool of the first main control valve (62) descends; and the two-position three-way valve

(61) is in a reset state, with the valve control oil inlet (612) and the valve control oil outlet (613) being in fluid communication,

by the control pump (64), drawing control oil from the oil supply unit (5) and delivering the control oil to the first drainage valve (43) and the second drainage valve (44) to maintain the first drainage valve (43) and the second drainage valve (44) in a reset state, and driving the three-way transfer valve (32) by the control oil to isolate the traction heat exchanger (31) from the braking heat exchanger (33);

S2: by the oil supply pump (51), driving transmission oil in the oil sump (52) to flow through the traction heat exchanger (31), then delivering the transmission oil to the first main control valve (62), and driving the first main control valve (62) via the electronic control valve module (2) to deliver the transmission oil to the A-direction torque converter (41) to implement an oil-charge operation;

S3: when a braking operation is required, placing a direction handle of a locomotive at a reverse position, disconnecting the first main control valve (62) via the electronic control valve module (2) to discharge the transmission oil in the A-direction torque converter (41), via the first main control valve (62), to the oil supply unit (5), and turning on the second main control valve (63)

and the two-position three-way valve (61),

compressed air in the air source module (1) entering the second main control valve (63) via the electronic control valve module (2), driving a valve spool of the second main control valve (63) to descend, meanwhile, a valve spool of the two-position three-way valve (61) moving toward one end of the two-position three-way valve (61), a control oil outlet a1 of the control pump (64) being isolated from the valve control oil inlet (612) of the two-position three-way valve (61), and the valve control oil outlet (613) being in fluid communication with an oil-sump return outlet of the oil supply unit (5), thereby discharging all the control oil remaining in the two-position three-way valve (61), the three-way transfer valve (32), the first drainage valve (43), and the second drainage valve (44);

S4: since the control oil in the control oil inlet a3 of the three-way transfer valve (32) is discharged, the three-way transfer valve (32) resetting, and the transmission oil inlet a1 of the three-way transfer valve (32) being in fluid communication with the transmission oil outlet a2 of the three-way transfer valve (32), thereby causing the traction heat exchanger (31) to be in fluid communication with the braking heat exchanger (33),

the oil supply pump (51) of the oil supply unit (5) drawing the transmission oil from the oil sump (52), the

transmission oil sequentially flowing through the traction heat exchanger (31) and the braking heat exchanger (33) and then reaching the second main control valve (63), descent of the valve spool of the second main control valve (63) causing the transmission oil outlet b1 of the second main control valve (63) to be in fluid communication with the transmission oil inlet b2 of the second main control valve (63),

the transmission oil outlet b2 of the braking heat exchanger (33) being in fluid communication with the transmission oil inlet b2 of the second main control valve (63), and the transmission oil outlet b1 of the second main control valve (63) being in fluid communication with a transmission oil inlet b3 of the B-direction torque converter (42), thereby causing the transmission oil to enter the B-direction torque converter (42) and starting an oil-charge operation; and

S5: the drain port b1 of the B-direction torque converter (42) being in fluid communication with the transmission oil inlet b2 of the second drainage valve (44), the transmission oil in the B-direction torque converter (42) entering the second drainage valve (44) and pushing a valve spool of the second drainage valve (44) to move toward one end of the second drainage valve (44), thereby causing the transmission oil inlet b2 of the second drainage valve (44) to be in fluid communication with the oil-drain channel

b3 of the second drainage valve (44),

a portion of the transmission oil in the B-direction torque converter (42) being discharged into the oil sump (52) of the oil supply unit (5) to implement an operation of partial-oil-charge reverse braking of the hydraulic transmission box.