Claims

1. A main drive high-pressure sealing system for shield machine comprising an air cushion bin, an oil and gas sealing chamber (P2), a compressed air input port, a first positive pneumatic regulating valve (21) and a first negative pneumatic regulating valve (51), wherein

an inlet of the compressed air input port is configured to connect with an air source, an outlet of the compressed air input port is connected to an inlet of the first positive pneumatic regulating valve (21), an outlet of the first positive pneumatic regulating valve (21) is connected to an inlet of the first negative pneumatic regulating valve (51) and the oil and gas sealing chamber (P2), and an outlet of the first negative pneumatic regulating valve (51) is connected to an exhaust pipeline;

a positive pressure detection terminal of the first positive pneumatic regulating valve (21) and a positive pressure detection terminal of the first negative pneumatic regulating valve (51) are both connected to the air cushion bin;

a negative pressure detection terminal of the first positive pneumatic regulating valve (21) and a negative pressure detection terminal of the first negative pneumatic regulating valve (51) are both connected to the oil and gas sealing chamber (P2);

when pressure difference between the air cushion bin and the oil and gas sealing chamber (P2) is greater than or equal to a first preset value, the first positive pneumatic regulating valve (21) is opened, and the first negative pneumatic regulating valve (51) is in a closed state; and

when the pressure difference between the air cushion bin and the oil and gas sealing chamber (P2) is less than or equal to a second preset value, the first negative pneumatic regulating valve (51) is opened, and the first positive pneumatic regulating valve (21) is in a closed state.

2. The main drive high-pressure sealing system for shield machine according to claim 1, further comprising a gearbox (P4), a second positive pneumatic regulating

valve (22) and a second negative pneumatic regulating valve (52), wherein

the outlet of the compressed air input port is connected to an inlet of the second positive pneumatic regulating valve (22), an outlet of the second positive pneumatic regulating valve (22) is connected to an inlet of the second negative pneumatic regulating valve (52) and the gearbox (P4), and an outlet of the second negative pneumatic regulating valve (52) is connected to the exhaust pipeline;

a positive pressure detection terminal of the second positive pneumatic regulating valve (22) and a positive pressure detection terminal of the second negative pneumatic regulating valve (52) are both connected to the oil and gas sealing chamber (P2);

a negative pressure detection terminal of the second positive pneumatic regulating valve (22) and a negative pressure detection terminal of the second negative pneumatic regulating valve (52) are both connected to the gearbox (P4);

when the pressure difference between the oil and gas sealing chamber (P2) and the gearbox (P4) is greater than or equal to a third preset value, the second positive pneumatic regulating valve (22) is opened, and the second negative pneumatic regulating valve (52) is in a closed state; and

when the pressure difference between the oil and gas sealing chamber (P2) and the gearbox (P4) is less than or equal to a fourth preset value, the second negative pneumatic regulating valve (52) is opened, and the second positive pneumatic regulating valve (22) is in a closed state.

3. The main drive high-pressure sealing system for shield machine according to claim 2, further comprising a leak detection chamber (P3), a third positive pneumatic regulating valve (23) and a third negative pneumatic regulating valve (53), wherein

the outlet of the second positive pneumatic regulating valve (22) is connected to an inlet of the third positive pneumatic regulating valve (23), an outlet of the third positive pneumatic regulating valve (23) is connected to an inlet of the third negative pneumatic regulating valve (53) and the leak detection chamber (P3), and an outlet of the third negative pneumatic regulating valve (53) is connected to the exhaust pipeline;

a positive pressure detection terminal of the third positive pneumatic regulating

valve (23) and a positive pressure detection terminal of the third negative pneumatic regulating valve (53) are both connected to the gearbox (P4);

a negative pressure detection terminal of the third positive pneumatic regulating valve (23) and a negative pressure detection terminal of the third negative pneumatic regulating valve (53) are both connected to the leak detection chamber (P3);

when the pressure difference between the gearbox (P4) and the leak detection chamber (P3) is greater than or equal to a fifth preset value, the third positive pneumatic regulating valve (23) is opened, and the third negative pneumatic regulating valve (53) is in a closed state; and

when the pressure difference between the gearbox (P4) and the leak detection chamber (P3) is less than or equal to a sixth preset value, the third negative pneumatic regulating valve (23) is opened, and the third positive pneumatic regulating valve (53) is in a closed state.

4. The main drive high-pressure sealing system for shield machine according to claim 3, wherein a first check valve (61) is provided at the outlet of the first negative pneumatic regulating valve (51);

and/or, a second check valve (62) is provided at the outlet of the second negative pneumatic regulating valve (52);

and/or, a third check valve (63) is provided at the outlet of the third negative pneumatic regulating valve (53).

5. The main drive high-pressure sealing system for shield machine according to claim 3, wherein a first safety valve (31) and/or a first pressure sensor (41) is further provided on an outlet connecting pipeline of the first positive pneumatic regulating valve (21);

and/or a second safety valve (32) and/or a second pressure sensor (42) is further provided on an outlet connecting pipeline of the second positive pneumatic regulating valve (22);

and/or a third safety valve (33) and/or a third pressure sensor (43) is further

provided on an outlet connecting pipeline of the third positive pneumatic regulating valve (23).

6. The main drive high-pressure sealing system for shield machine according to claim 3, further comprising an emergency pressure relief pipeline connected to the oil and gas sealing chamber (P2), the gearbox (P4) and the leak detection chamber (P3).

7. The main drive high-pressure sealing system for shield machine according to claim 6, wherein a fourth check valve (71) is provided between the oil and gas sealing chamber (P2) and the emergency pressure relief pipeline;

and/or, a fifth check valve (72) is provided between the gearbox (P4) and the emergency pressure relief pipeline;

and/or, a sixth check valve (73) is provided between the leak detection chamber (P3) and the emergency pressure relief pipeline;

and/or, a first ball valve (8) is provided on the emergency pressure relief pipeline;

and/or, a first muffler (91) is provided on the emergency pressure relief pipeline.

8. The main drive high-pressure sealing system for shield machine according to claim 1, wherein a second muffler (92) is provided on the exhaust pipeline.

9. A slurry balance shield machine, provided with the main drive high-pressure sealing system for shield machine according to any one of claims 1 to 8.

10. The slurry balance shield machine according to claim 9, further comprising

a liquid level controller (12) configured to detect a liquid level in a gear oil chamber;

and/or, a respirator (13) configured to empty the gearbox (P4);

and/or, an oil and gas sealing tank (11) provided between the oil and gas sealing

chamber (P2) and the gear oil chamber, wherein a high limit liquid level switch (101) and/or a low limit liquid level switch (102) are provided on the oil and gas sealing tank (11).