CLAIMS

What is claimed is:

1. A wireline retrievable safety valve for use in a tubing retrievable safety valve (TRSV) disposed downhole in a wellbore, comprising:

a body having a bore therethrough, a control port, and a balance port;

an operating piston;

a balance piston having a head and a rod; and

a valve having an open position and a closed position;

wherein:

the control port is in fluid communication with a first side of the operating piston;

the balance port is in fluid communication with a first side of the balance piston head;

a second side of the operating piston and a second side of the balance piston head are configured to be in fluid communication with the wellbore through one or more wellbore pressure ports;

the balance piston rod extends outward from the first side of the balance piston head;

the balance piston rod is configured to be in fluid communication with the wellbore;

the operating piston and the balance piston are linked to move together; and

the valve is configured so that sufficient pressure applied to the operating piston through the control port opens the valve.

2. The safety valve of claim 1, wherein the first side of the operating piston is axially opposed to the first side of the balance piston head.

3. The safety valve of claim 2, wherein the first side of the operating piston has a first surface area, the second side of the operating piston has a second surface area, the first side of the balance piston head has a third surface area, the second side of the balance piston head has a fourth surface area, and the balance piston rod has a fifth surface area; and wherein the first surface area is approximately equal to the second surface area, the first surface area is approximately equal to the third surface area, the fourth surface area is approximately equal to the third surface area plus the fifth surface area, and the fourth surface area is approximately equal to the second surface area plus the fifth surface area.

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4. The safety valve of claim 3, wherein the operating piston comprises a head and a rod, the rod extends outward from the second side of the operating piston head opposite the first side of the operating piston, and the second side of the operating piston comprises both the second side of the operating piston head and the operating piston rod.

5. The safety valve of claim 1, wherein the operating piston and the balance piston are linked by a connecting ring.

6. The safety valve of claim 1, wherein:

the body is configured to be disposed in a bore of a tubing retrievable safety valve, wherein the tubing retrievable safety valve is in fluid communication with a control line and a balance line;

the body is configured to place the control port in fluid communication with the control line through the TRSV and the balance port in fluid communication with the balance line through the TRSV; and

the body is configured to lock a valve of the TRSV open.

7. The safety valve of claim 1, wherein the balance port and the control port are axially spaced apart.

8. The safety valve of claim 1, further comprising three seals, wherein the three seals are configured to form two sealed spaces between the body and the TRSV, wherein the control port is disposed in a first sealed space and the balance port is disposed in a second sealed space.

9. The safety valve of claim 1, further comprising:

a sliding sleeve disposed within the body, having a first position and a second position, wherein in the first position the valve is closed and in the second position the sleeve extends through the valve to hold the valve open; and

a spring configured to bias the sleeve from the second position towards the first position;

wherein the spring does not have to overcome hydrostatic pressure of the control line to close the valve.

10. A safety valve for use in a wellbore, comprising:

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a body having a bore therethrough, a control port, and a balance port;

an operating piston in fluid communication with the control port;

a balance piston in fluid communication with the balance port; and

a valve having an open position and a closed position;

wherein:

the operating piston and the balance piston are linked to move axially together;

pressure from the control port on the operating piston is axially opposed to pressure from the balance port on the balance piston, such that pressure on one acts downhole, while pressure on an other acts uphole;

the valve is configured so that sufficient pressure applied to the operating piston through the control port opens the valve; and

the body is configured to seat within a TRSV and thereby to hold open a valve of the TRSV.

11. The safety valve of claim 10, wherein wellbore pressure is applied to each of the operating piston and the balance piston; and wherein the wellbore pressure on the operating piston is axially opposed to the wellbore pressure on the balance piston such that wellbore pressure on one acts uphole while wellbore pressure on the other acts downhole.

12. The safety valve of claim 11, wherein wellbore pressure is applied to the operating piston opposite the pressure from the control port, and wellbore pressure is applied to the balance piston opposite the pressure from the balance port.

13. A system for use downhole in a wellbore, comprising:

a tubular string having a TRSV disposed therein;

the wireline retrievable safety valve (WRSV) of claim 1 disposed in a bore of the TRSV;

a control line providing control pressure from the surface to the TRSV;

a balance line providing balance pressure from the surface to the TRSV;

wherein:

the WRSV holds a flapper valve of the TRSV open;

a control port of the WRSV is in fluid communication with the control line through the TRSV;

a balance port of the WRSV is in fluid communication with the balance line through the TRSV; and

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pressure applied through the control line is operable to open a valve of the WRSV.

14. The system of claim 13, wherein the first side of the operating piston is axially opposed to the first side of the balance piston head, such that pressure on the first side of the operating piston acts downhole, while pressure on the first side of the balance piston head acts uphole.

15. The system of claim 13, wherein the TRSV comprises a TRSV operating piston in fluid communication with the control line.

16. The system of claim 13, wherein prior to disposing the WRSV in the bore of the TRSV, the TRSV flapper valve is no longer functional.

17. A method of providing hydraulic safety valve functionality in a wellbore, comprising:

seating the WRSV of claim 1 in a bore of a TRSV disposed in the wellbore, wherein a control line provides control pressure to the TRSV and a balance line provides balance pressure to the TRSV;

providing fluid communication between the control line and an operating piston of the WRSV through the TRSV; and

providing fluid communication between the balance line and a balance piston of the WRSV through the TRSV;

wherein seating the WRSV in the bore of the TRSV holds open a valve of the TRSV.

18. The method of claim 17, wherein the operating piston and the balance piston of the WRSV are linked to move together; and pressure from the control line on the operating piston is axially opposed to pressure from the balance line on the balance piston;

the method further comprising providing wellbore pressure to each of the operating piston and the balance piston, with the wellbore pressure on the operating piston axially opposed to the wellbore pressure on the balance piston.

19. The method of claim 18, wherein wellbore pressure provided to the operating piston is opposite pressure from the control line, and wellbore pressure provided to the balance piston is opposite pressure from the balance line.

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20. The method of claim 17, further comprising providing balance pressure through the balance line sufficient to overcome hydrostatic pressure of the control line.

21. The method of claim 20, further comprising providing control pressure through the control line to open a valve of the WRSV.

22. The method of claim 17, wherein providing fluid communication between the control line and an operating piston of the WRSV through the TRSV comprises opening a first flowpath through the TRSV; and providing fluid communication between the balance line and a balance piston of the WRSV through the TRSV comprises opening a second flowpath through the TRSV.

23. The method of claim 22, wherein seating the WRSV in the bore of the TRSV provides sealing between the WRSV and the TRSV, forming a first sealed space between the TRSV and the WRSV and a second sealed space between the TRSV and the WRSV; wherein the first and second sealed spaces are axially offset; wherein the first flowpath is in fluid communication with the first sealed space, and the second fluid flowpath is in fluid communication with the second sealed space; and wherein the operating piston is in fluid communication with the first sealed space, and the balance piston is in fluid communication with the second sealed space.