

CLAIMS

1. A **device**, comprising or including,
 - a dump chamber to receive high pressure fluid from a high pressure fluid source,
 - a dose chamber, to receive a flow of the high pressure fluid from the dump chamber via a flow path from the dump chamber to the dose chamber, having an outlet,
 - a working chamber having an inlet end at an end thereof,
 - a dose valve member with an annular sealing surface surrounding the inlet end,
 - wherein with the dose valve member in a closed condition the sealing surface meets with an annular seat to seal the outlet; and with the dose valve member in an open condition a gap is presented between the annular sealing surface and the seat to allow high pressure fluid to move from the outlet to the inlet,
 - wherein the high pressure fluid in the dump chamber, at least in part, holds the dose valve member in the closed condition, until the high pressure fluid pressure in the dump chamber is reduced, whereby the high pressure fluid in the dose chamber unseats the dose valve member to the open position.
2. A device as claimed in claim 1 wherein when the dose valve member is open flow of high pressure fluid is prevented from entering the dose chamber or the dump chamber.
3. A device as claimed in either of claims 1 or 2 wherein when the dose valve member is open flow of high pressure fluid is prevented from entering the dump chamber.
4. A device as claimed in any one of claims 1 to 3 wherein the high pressure fluid flowing into the working chamber then performs work on a workload therein to expel it from, or move it to or toward, an opposing end of the working chamber.
5. A device as claimed in claim 4 wherein as the work load is driven from the first end (or inlet end) to the second end (or opposing end) there is no fluid connection available from any high pressure fluid source to the work load driving assembly or chambers.

6. A device as claimed in any one of claims 1 to 5 wherein the dose valve member slides linearly.
7. A device as claimed in any one of claims 1 to 6 wherein the dose valve member slides along a linear axis parallel to the major axis of the device.
8. A device as claimed in any one of claims 4 to 7 wherein the work load, whether captive, such as a piston, or expelled, such as a projectile, slides linearly along the working chamber from the inlet end, to or towards the opposing, distal end, parallel to the major axis.
9. A device as claimed in any one of claims 1 to 8 wherein the dump chamber, dose chamber, and working chamber, lie concentric with, or parallel with, the major axis.
10. A device as claimed in any one of claims 1 to 9 wherein there is an exhaust valve that is biased open, at or toward the inlet end, and which closes off an exhaust port under actuation from the high pressure fluid leaving the dose chamber.
11. A device as claimed in claim 10 wherein the exhaust port opens when the work load is at or near the opposing end, under the action of the bias.
12. A device as claimed in either of claims 10 or 11 wherein the exhaust valve is a piston or diaphragm which is at least partially encircled by the dose valve
13. A device as claimed in any one of claims 1 to 12 wherein the dose valve is at least in part biased in the closed condition.
14. A device as claimed in any one of claims 1 to 13 wherein the dose chamber is a hollow volume radially outward or inward from the working chamber.
15. A device as claimed in any one of claims 1 to 14 wherein the flow path is via the dose valve.

16. A device as claimed in claim 15 wherein the flow path is in a skirt of the dose valve.
17. A device as claimed in any one of claims 1 to 16 wherein there is a restriction in the flow path from the dump chamber to the dose chamber, such that the dump chamber will add to the closing pressure of the dose valve even when filling the dose chamber.
18. A device as claimed in any one of claims 1 to 17 wherein there is a one way valve in the flow path from the dump chamber to the dose chamber.
19. A device as claimed in any one of claims 1 to 18 wherein the dump chamber is an hollow cylindrical volume, such as an annular chamber.
20. A device as claimed in any one of claims 1 to 19 wherein the pressure in the dump chamber is reduced by a trigger mechanism or similar.
21. A device as claimed in claim 20 wherein the trigger mechanism dumps the pressure in the dump chamber to atmosphere.
22. A device as claimed in any one of claims 1 to 21 wherein the workload is returned to the inlet end by a fluid cushion on a back side thereof, or a spring on a back side or front side, or a tensile member connected from a front side to or towards the inlet end.
23. A device as claimed in any one of claims 10 to 12 wherein the bias on the exhaust valve is a spring.
24. A device as claimed in claim 23 wherein, or in addition the bias on the exhaust valve is a tensile member connected between the workload and the exhaust valve.
25. A device as claimed in any one of claims 1 to 24 wherein there is a safety valve to selectively dump pressure from the dose chamber to prevent operation of the device.
26. A device as claimed in any one of claims 1 to 24 wherein there is a slow leak safety valve that releases fluid pressure from the dose chamber should the high pressure

fluid supply pressure drop below that of the dose chamber.

27. A **method of operating a high pressure fluid device**, comprising or including the steps of,

Filling a dump chamber with a high pressure fluid,

Increasing a sealing pressure of a valve member by the high pressure fluid acting on a back side of the valve member, to hold the valve member in a closed condition, the valve member having an annular sealing surface between an outlet from a dose chamber, and an inlet to a working chamber,

Passing high pressure fluid from the dump chamber to the dose chamber via a flow path,

Reducing the pressure of the dump chamber such that the high pressure fluid in the dose chamber, acting on a front side of the valve member, forces the valve member to an open condition presenting a gap between the inlet and the outlet,

The high pressure fluid then entering the working chamber from the dose chamber to perform work on a workload within the working chamber.

28. A method as claimed in claim 27 wherein the dump chamber and dose chamber when filled prior to reducing the pressure are at nearly the same pressure.

29. A method as claimed in either claim 27 or 28 wherein an exhaust valve is moved to a position where it closes off an exhaust port from the working chamber, until the work is done on the work load, at which time the exhaust port opens, for example under a bias.

30. A method as claimed in claim 29 wherein the method includes the step of allowing the work load to return to the inlet end of the working chamber, any fluid between the work load and the inlet end exiting through the exhaust port.

31. A method as claimed in either of claims 29 or 30 wherein the exhaust port is biased open save for when the high pressure fluid exits the dose chamber such that the bias is over come and the exhaust valve moves to the closing position of the exhaust port(s).

32. A method as claimed in any one of claims 27 to 31 wherein the dose valve member moves to the closed position once the work load moves to or toward the opposing end.
33. A method as claimed in any one of claims 27 to 32 wherein a trigger mechanism reduces the pressure in the dump chamber.
34. A method as claimed in any one of claims 27 to 33 wherein the work load is returned to the inlet end by a bias, such as, but not limited to a fluid cushion/pressure bias, or compressive member on a back, non-working side of the work load, and or a tensile member on a front working side of the work load.
35. A method as claimed in any one of claims 27 to 34 wherein the dump chamber, and dose chamber are free to fill again once the dose valve member is in a closed position.
36. A method as claimed in any one of claims 27 to 35 wherein, or in addition, the filling of the dump chamber aids in closing the dose valve member.
37. A method as claimed in any one of claims 27 to 36 wherein the method includes the step of optionally dumping the high pressure fluid in the dose chamber to atmosphere to prevent the device from operating.
38. A **device** as described herein with reference to any one or more of the accompanying drawings.
39. A **method of operating a high pressure fluid device**, as described herein with reference to any one or more of the accompanying drawings.