Claims:

1. A pump comprising a housing (141) having a cavity (142) with an inlet valve (143), an apparatus (144) for raising pressure in a fluid in the cavity (142) and a discharge valve (145), the discharge valve (145) comprising a valve head (160) movable between an open and closed position and a valve seat (167) characterised in that the pump further comprises a booster piston (182) arranged in a booster cylinder (183), the booster piston (182) having a first face (191) exposed to a low pressure zone (189) and a second face (194) exposed to fluid pressure in said cavity (142), at least one of said booster piston (182) and said booster cylinder (183) movable relative to the other to add an opening force to the discharge valve (145).

2. A pump as claimed in Claim 1 further comprising a transfer member (169) arranged between the valve head (160) and the booster (182).

3. A pump as claimed in Claim 2 wherein the transfer member (169) has a first end and a second end, the first end fixed to the valve head (160) and the second end free.

4. A pump as claimed in Claim 3, wherein the transfer member (169) passes through the cylinder (183) into the low pressure zone (189) and the second end arranged in the path of movement of the booster (182) in the cylinder (183).

5. A pump as claimed in any preceding claim, wherein the booster (182) is free floating in the cylinder (183).

6. A pump as claimed in any preceding claim, further comprising an inlet (148) for allowing fluid to flow to the inlet valve (143), wherein the booster cylinder (183) further comprises an opening therein fluidly connected to the inlet (148) to allow fluid in the inlet to flow into

and from the low pressure zone (188) in the booster cylinder (183).

7. A pump as claimed in any one of Claims 1 to 5, wherein the booster cylinder (183) further comprises an opening therein connected to a low pressure source.

8. A pump as claimed in any preceding claim, wherein the pump is for circulating drilling mud through a drill string.

9. A pump as claimed in any preceding claim, wherein the low pressure zone is filled with drilling mud.

10. A pump as claimed in any one of Claims 1 to 9, wherein the pump is for pumping cement.

11. A pump as claimed in any preceding claim, wherein the apparatus (144) for raising pressure in a fluid in the cavity (142) comprises a reciprocating piston.

12. A pump as claimed in any preceding claim, wherein the apparatus (144) for raising pressure in a fluid in the cavity (142) comprises a motor.

13. A pump as claimed in any preceding claim, wherein the apparatus (144) for raising pressure in a fluid in the cavity (142) comprises a hydraulic pump.

14. A pump as claimed in any preceding claim, the valve head (160) of the discharge valve (145) further comprises a spider (298).

15. A pump as claimed in Claim 14, wherein the valve seat (267) comprises a portion (241′) which extends therefrom in which the spider (298) is arranged.

16. A pump as claimed in any preceding claim, wherein the discharge valve (145) further comprises a spring (166) for biasing the valve head (160) against the valve seat (167).

17. A valve assembly for use in the pump as claimed in any preceding claim, the valve assembly comprising a valve head (160) movable between an open and closed position and a valve seat (167) characterised in that the

valve assembly further comprises a booster piston (182) arranged in a booster cylinder (183), at least one of said booster piston (182) and said booster cylinder (183) movable relative to the other to add an opening force to the valve head (160), a transfer member (169) extending between the valve head (160) and the booster piston (182), the transfer member (169) has a first end and a second end, wherein the first end fixed to the valve head (160) and the second end free, wherein the booster piston (182) is free floating in the cylinder (183).

18. A valve assembly for use in the pump as claimed in any of Claims 1 to 16, the valve assembly comprising a valve head (160) movable between an open and closed position and a valve seat (167) characterised in that the valve assembly further comprises a booster piston (182) arranged in a booster cylinder (183), at least one of said booster piston (182) and said booster cylinder (183) movable relative to the other to add an opening force to the valve head (160), a transfer member (169) extending between the valve head (160) and the booster piston (182), the transfer member (169) has a first end and a second end, wherein the first end fixed to the booster piston (182) and the second end free, wherein the booster piston (182) and transfer member (169) fixed thereto are free floating in the cylinder (183) to allow the second end of the transfer member (169) to selectively abut the valve head (160).

19. A method for facilitating opening a valve comprising a valve head (160) and a valve seat (167), the valve head (160) movable a predetermined distance from a closed position on the valve seat (167) to a fully open position distant to the valve seat, the method comprising the steps of applying a force to the valve head (160) provided by a fluid pressure differential across the valve head and further comprising the step of providing

an additional force to the valve head (160) along a small portion of the predetermined distance.

20. A method as claimed in Claim 19, wherein the small portion is between 1% and 95% of the predetermined distance.

21. A method as claimed in Claim 19, wherein the small portion is between 5% and 33% of the predetermined distance.