CLAIMS

1. A vacuum system non-return valve comprising:

a baffle for extending across a flow path in said vacuum system, said baffle comprising an aperture, a perimeter of said aperture comprising a valve seat;

a valve member comprising a curved sealing surface configured to mate with said valve seat, said valve member and aperture being configured such that said valve member obscures said aperture and seals with said valve seat to impede a flow of fluid from an outlet end to an inlet end in a closed position and is displaceable in use to move away from said valve seat and allow a fluid flow from said inlet end to said outlet end in an open position;

at least a portion of ~~said~~ a surface of said baffle surrounding said aperture slopes inwardly towards said inlet end of said valve such that said aperture is smaller at said inlet end than it is at said outlet end; ~~and~~

wherein

diametrically opposing portions of said sloped surface~~s~~ of said aperture subtend an angle of between 30º and 70º~~.~~; and

wherein the angle of the sloped surface and the relative sizes of the aperture and valve member are selected so that the sloped surface at the valve seat is tangential to the curved sealing surface of the valve member.

2. A vacuum system non-return valve according to claim 1, wherein said diametrically opposing portions of said sloped surface~~s~~ of said aperture subtend an angle of between 30º and 55º.

3. A vacuum system non-return valve according to claim 1 or 2, wherein said diametrically opposing portions of said sloped surface~~s~~ of said aperture subtend an angle of between 30º and 45º.

4. A vacuum system non-return valve according to any preceding claim, wherein a material forming said valve member has a roughness of between 0.01 and 0.5 Ra.

5. A vacuum system non-return valve according to any preceding claim, wherein a material forming said valve seat has a roughness of between 0.1 and 1.0 Ra, preferably between 0.3 and 0.5 Ra.

6. A vacuum system non-return valve according to any preceding claim, wherein the non-return check valve is made completely of metal.

~~6~~7. A vacuum system non-return valve according to any preceding claim, wherein said valve member and said valve seat are formed of stainless steel.

~~7~~8. A vacuum system non-return valve according to any one of claims 1 to ~~5~~7, wherein said valve member and said valve seat are formed of different metals.

~~8~~9. A vacuum system non-return valve according to any preceding claim, wherein said sloped portion of said surface surrounding said aperture extends from a surface facing said outlet end of said valve towards said surface facing said inlet end and becomes steeper for a portion extending to said surface facing said inlet end, said valve seat being at a location at or close to a change in said angle of slope.

10. A vacuum system non-return valve according to any preceding claim, further comprising a cage type mechanism for retaining the valve member within the valve, wherein the cage type mechanism limits travel of the valve member towards the outlet end of the valve.

11. A pipe comprising the vacuum system non-return valve of claim 10, wherein the baffle and the cage type mechanism extend across the pipe.

12. The pipe of claim 11, wherein the cage type mechanism is retained within the pipe as an interference fit.

~~9. A vacuum system non-return valve according to claim 1, wherein said sloped surface of said baffle surrounding said aperture comprises an indent such that said valve member is configured to contact said sloped surface surrounding said aperture at two places at either end of said indent.~~

~~10. A vacuum system non-return valve according to any preceding claim, wherein said valve member is hollow.~~

~~11. A vacuum system non-return valve according to any preceding claim, comprising a protrusion extending from said curved surface of said valve member, said protrusion extending through said aperture and comprising a retaining portion extending outwardly from said protrusion and configured to limit the travel of the valve member towards said outlet end when said valve is in said open position.~~

~~12. A vacuum system non-return valve apparatus comprising two vacuum, system non-return valves according to any preceding claim, arranged in series with respect to each other, such that fluid from an inlet end of said valve apparatus flows through a first of said non-return valves and then through a second of said non-return valves.~~

~~13. A vacuum system non-return valve apparatus according to claim 12, further comprising an intermediate volume providing a flow path between said valve seats of said two valves, said flow path having a length of between 1.5 and 10 times a length of a diameter of said valve seats.~~

~~14. A vacuum system non-return valve apparatus according to claim 13, wherein said flow path has a length of between 1.5 and 6 times a diameter of said valve seats.~~

~~15. A vacuum system non-return valve apparatus according to any one of claims 12 to 14, said intermediate volume being within a pipe connecting said first and second intermediate valves.~~

~~16. A vacuum system non-return valve apparatus according to any one of claims 12 to 13, comprising a combined outer housing for housing both said first and second check valves.~~

~~17. A vacuum system non-return valve apparatus according to claim 16, wherein said combined outer housing is configured such that a flow path between said check valves comprises a portion running in an opposite direction to a flow path in and out of said valve apparatus.~~