CLAIMS

1. A multiple stage rotary vacuum pump comprising:

a stator comprising multiple pumping stages;

at least one inter-stage divider separating two adjacent pumping stages;

said at least one inter-stage divider comprising two walls defining a cavity therebetween, an upstream wall bounding an upstream pumping stage and a downstream wall bounding a downstream pumping stage of said two adjacent pumping stages;

said cavity comprising at least a portion of a pressure relief fluid flow path, said pressure relief fluid flow path providing a path from an outlet portion of said upstream stage towards an inlet portion of said upstream stage or towards an exhaust, said pressure relief fluid flow path comprising an orifice, said orifice comprising a valve seat; and

a pressure relief valve configured to move between a compressed and an elongated state, said pressure relief valve sealing said orifice when in said elongated state and being configured to move to said compressed state such that said orifice is not obstructed, in response to pressure in said upstream stage rising above a predetermined value.

~~2.~~ ~~A~~ a multiple stage rotary vacuum pump ~~according to Claim 1,~~ wherein said pressure relief valve comprises retaining means for releasably retaining said valve in said compressed state.

~~3~~2. A multiple stage rotary vacuum pump according to claim ~~2~~1, wherein an outer sealing face of said valve comprises a receiving means configured to receive a tool for rotating said outer sealing face to release or engage said retaining means.

~~4~~3. A multiple stage rotary vacuum pump according to claim ~~2~~ 1 or ~~3~~2, wherein said retaining means comprises a hook and a retainer for retaining said hook, one of said hook and retainer being attached to a fixed end of said valve and the other of said hook and retainer to a sealing end, said valve being

configured such that rotation of said sealing end of said valve engages or releases said hook from said retainer.

~~5~~4. A multiple stage rotary vacuum pump according to any one of claims 1 to ~~4~~3, wherein said orifice is located in one wall of said inter-stage divider and comprises an outlet of said upstream pumping stage.

~~6~~5. A multiple stage rotary vacuum pump according to any one of claims 1 to ~~4~~3, wherein said cavity comprises a pumping fluid flow path, said pumping fluid flow path providing a path from said outlet portion of said upstream stage towards an inlet portion of said downstream stage, said pumping fluid flow path and said pressure relief fluid flow path comprising said orifice, at a junction of said paths.

~~7~~6. A multiple stage rotary vacuum pump according to claim ~~6~~5, wherein a portion of said pressure relief fluid flow path from said outlet portion of said upstream stage to said orifice comprises a combined pressure relief fluid flow and pumping fluid flow path.

~~8~~7. A multiple stage rotary vacuum pump according to any one of claims 1 to ~~5~~4, wherein said pressure relief valve is configured to extend between said two walls, a fixed end of said valve being mounted in said downstream wall and a sealing end of said valve extending to said upstream wall when said valve is in said elongated state.

~~9~~8. A multiple stage rotary vacuum pump according to any preceding claim, wherein said vacuum pump comprises a recess for receiving a fixed end of said valve.

~~10~~9. A method of assembling a valve within an inter-stage cavity between walls separating two adjacent pumping stages, said method comprising:

inserting a pressure relief valve retained in a compressed state by retaining means, between said walls of said inter-stage cavity, said pressure

relief valve comprising a sealing end for engaging with a valve seat in an orifice within a pressure relief fluid flow path and an opposing end, said pressure relief fluid flow path passing through said inter-stage cavity and connecting an outlet portion of an upstream stage either to an inlet portion of said upstream stage or to an exhaust;

locating said valve within said fluid flow path; and

releasing said valve from said compressed state such that said valve moves to an extended state and a sealing end of said valve mates with said valve seat in said orifice.

~~11~~10. A method according to claim ~~10~~9, wherein said orifice is located in an upstream wall of said cavity; and

said locating step comprises locating said opposing end of said valve within a recess in a downstream wall of said inter-stage cavity; and

releasing said valve from said compressed state such that said valve moves to an extended state and said sealing end mates with said valve seat in said upstream wall.

~~12~~11. A method according to claim ~~10~~9, wherein said orifice is located in a wall of a pumping fluid flow path within said cavity, said orifice linking said pumping fluid flow path and said pressure relief fluid flow path; and

said locating step comprises locating said opposing end of said valve within a recess in a wall of said pressure relief fluid flow path~~; and~~

~~releasing said valve from said compressed state such that said valve moves to an extended state and said sealing end mates with said valve seat in said orifice.~~.

~~13~~12. A method of assembling a valve according to any one of claims ~~10~~ 9 to ~~12~~11, wherein said retaining means comprises an engaging portion adapted to rotatably engage with a retainer, said engaging portion being attached to one of said sealing or opposing ends and said retainer being attached to the other of said sealing or opposing ends, said step of releasing said valve from said

compressed state comprises rotating said sealing end such that said retainer disengages with said engaging portion.

~~14~~13. A method of assembling a valve according to claim ~~13~~12, wherein said engaging portion comprises a hook.

~~15~~14. A method of assembling a valve according to claim ~~13~~ 12 or ~~14~~13, wherein said step of releasing said valve from said compressed state comprises engaging a receiving means on an outer face of said sealing end with a tool and rotating said tool until said retainer releases said engaging portion.