

**WE CLAIM:**

1. An assembly comprising:

a cylinder comprising a bore and a section capable of containing a fluid;  
a piston assembly capable of translating axially along an axis of the bore, wherein the piston assembly comprises a piston face;  
at least one bearing element affixed to the piston assembly and configured to provide a flow of a bearing fluid into a clearance gap formed between the piston assembly and the cylinder, wherein the bearing fluid is comprised of a gaseous bearing fluid; and  
at least one or more passages configured to route blow-by gas away from a portion of the clearance gap adjacent to the bearing element.

2. The assembly of claim 1, wherein the piston assembly further comprises a feed passage configured to receive the bearing fluid from a fluid source and to provide the bearing fluid to the bearing element.

3. The assembly of claim 2, wherein the bearing element comprises a porous annular element that allows the bearing fluid to flow radially outward through pores from the feed passage to the clearance gap.

4. The assembly of claim 2, wherein the bearing element comprises one or more radial holes configured to allow the bearing fluid to flow radially outward from the feed passage to the clearance gap.

5. The assembly of claim 1, wherein the bearing element comprises at least one of a graphite element, a metal element with machined features, a sintered metal element, a porous ceramic element, and a nonporous ceramic element.

6. The assembly of claim 1, wherein the bearing fluid comprises air.

7. The assembly of claim 1, wherein the fluid contained in the section comprises a gas, and wherein the piston assembly further comprises a feature or component that aids in centering the piston assembly about an axis of the bore using a flow of blow-by gas from the section.

8. The assembly of claim 1, wherein the fluid contained in the section comprises a gas.

9. The assembly of claim 1, wherein the fluid contained in the section comprises a gas, and wherein the piston assembly further comprises a labyrinth seal configured to affect a flow of blow-by gas.

10. The assembly of claim 9, wherein the labyrinth seal comprises a plurality of circumferential grooves.

11. The assembly of claim 1, wherein the flow of the bearing fluid is configured to form a fluid layer in the clearance gap.

12. The assembly of claim 11, wherein the fluid layer aids in centering the piston assembly about an axis of the bore.

13. The assembly of claim 1, wherein the section comprises at least one of a combustion section and a gas driver section, and wherein the piston face is configured to contact the section.

14. The assembly of claim 1, wherein the assembly is configured for oil-less operation.

15. The assembly of claim 1, further comprising a seal affecting a flow of the blow-by gas.

16. An assembly configured to translate axially along an axis of a cylinder comprising a section capable of containing a fluid, the assembly comprising:

a piston face configured to contact the section;

at least one bearing element affixed to the assembly and configured to provide an outward flow of a bearing fluid to a surface of the assembly, wherein the assembly does not contact the cylinder; and

at least one or more passages configured to route blow-by gas from the section away from the bearing element.

17. The assembly of claim 16, further comprising a feed passage, wherein the feed passage is configured to receive the bearing fluid from a fluid source and to provide the bearing fluid to the bearing element.

18. The assembly of claim 17, wherein the bearing element comprises a porous annular element that allows the bearing fluid to flow radially outward through pores from the feed passage to the surface of the assembly.

19. The assembly of claim 17, wherein the bearing element comprises one or more radial holes configured to allow the bearing fluid to flow radially outward from the feed passage to the surface of the assembly.

20. The assembly of claim 16, wherein the fluid contained in the section comprises a gas, the piston assembly further comprising a feature that aids in centering the piston assembly about an axis of the cylinder using a flow of blow-by gas from the section.

21. The assembly of claim 16, wherein the fluid contained in the section comprises a gas, the assembly further comprising a labyrinth seal configured to affect a flow of blow-by gas.

22. The assembly of claim 16, wherein the fluid contained in the section comprises a gas.

23. The assembly of claim 16, wherein the bearing fluid comprises air.

24. The assembly of claim 16, wherein the section comprises at least one of a combustion section and a gas driver section, and wherein the piston face is configured to contact the section.

25. The assembly of claim 16, wherein the assembly is configured for oil-less operation.
26. The assembly of claim 16, further comprising a seal affecting a flow of the blow-by gas.
27. A cylinder of a piston engine, the cylinder comprising:  
a bore capable of housing a piston movable along an axis of the bore;  
at least one bearing element configured to provide a flow of a bearing fluid to the bore,  
wherein the piston does not contact the cylinder; and  
a feed passage configured to receive the bearing fluid from a fluid source and provide the  
bearing fluid to the bearing element, wherein the bearing element comprises a porous annular  
element configured to allow the bearing fluid to flow radially inward through pores from the feed  
passage to the bore.
28. The cylinder of claim 27, wherein the bearing element further comprises one or more radial  
holes configured to allow the bearing fluid to flow radially inward from the feed passage to the  
bore.
29. The cylinder of claim 27, wherein the cylinder is configured for oil-less operation.

Dated this 26<sup>th</sup> day of June 2014.



Abhishek Sen  
of S. MAJUMDAR & CO.  
Applicant's Agent