vapour (e.g. water vapour). A flexible tubular gases conduit delivers the gases to a user or patient downstream from the humidifier chamber.

**[0012]** An exemplary CPAP apparatus is described in WO 2011/056080.

**[0013]** A high flow apparatus may be used to deliver a high gas flow or high flow therapy to a patient to assist with breathing and/or treat breathing disorders including chronic obstructive pulmonary disease (COPD). A high flow apparatus includes a gases supply and typically includes a humidification apparatus.

**[0014]** The breathing assistance apparatuses typically have one or more accessories such as a breathing conduit and a patient interface such as a cannula or mask for delivering gases to a patient. The conduit enables gases to be delivered from the housing of the breathing assistance apparatus to the patient. For example, the apparatus may be placed on a floor or other support surface, and the patient may be in a bed. The breathing assistance apparatus may have a recess for receipt of a humidifier liquid chamber. The liquid chamber will receive liquid from, for example, a flexible liquid bag that delivers liquid to a humidifier liquid chamber via one or more tubes. Alternatively, the liquid chamber can be removed and refilled as required. The recess will contain a heater plate to heat the liquid chamber, to humidify gases passing through the liquid chamber. The humidified gases are then delivered to the patient.

**SUMMARY**

**[0015]** In accordance with certain features, aspects and advantages of at least one of the embodiments disclosed herein, a humidifier liquid chamber having a generally circular peripheral shape or a humidifier liquid chamber manifold is disclosed, the humidifier liquid chamber or humidifier liquid chamber manifold comprising:

first and second base unit connection ports for connecting to a breathing assistance apparatus base unit, the base unit connection ports defining respective axes;

wherein the base unit connection ports are substantially parallel to each other and are separated by a port separation distance between the axes, and the axes of the first and second base unit connection ports are configured to be in a substantially horizontal orientation when the humidifier liquid chamber or humidifier liquid chamber manifold is in use;

wherein at least one of the base unit connection ports has a sealing depth defined by a portion of the port that is configured to overlap with a complementary

chamber connection port of the base unit, wherein a ratio of the sealing depth to port separation distance is more than 0.25 and up to 0.7.

**[0016]**

**[0017]** In some configurations, the ratio of the sealing depth to port separation distance is between about 0.3 and about 0.7.

**[0018]** In some configurations, the ratio of the sealing depth to port separation distance is about 0.475.

**[0019]** In some configurations, the sealing depth is more than about 10 mm.

**[0020]** In some configurations, the sealing depth is more than about 10 mm and up to about 16 mm.

**[0021]** In some configurations, the sealing depth is more than about 12 mm.

**[0022]** In some configurations, the sealing depth is more than about 12 mm and up to about 16 mm.

**[0023]** In some configurations, the at least one of the base unit connection ports is configured to seal with at least two seals on the complementary chamber connection port.

**[0024]** In some configurations, the base unit connection ports each have an exterior face, and wherein the exterior faces are substantially planar and are substantially perpendicular to the axes.

**[0025]** In some configurations, the humidifier liquid chamber manifold comprises first and second manifold-to-chamber connection ports for connecting to a humidifier liquid chamber, wherein the first manifold-to-chamber connection port is in fluid communication with the first base unit connection port, and wherein the second manifold-to-chamber connection port is in fluid communication with the second base unit connection port.

**[0026]** In some configurations of the humidifier liquid chamber manifold, a first conduit extends between and fluidly connects the first manifold-to-chamber connection port and the first base unit connection port, and a second conduit

**[0046]** In some configurations of the humidifier liquid chamber, each flow tube comprises a gas bleed aperture in an upper surface of the flow tube.

**[0047]** In some configurations of the humidifier liquid chamber, the humidifier liquid chamber comprises a step in the humidifier liquid chamber.

**[0048]** In some configurations of the humidifier liquid chamber, a base of the step is located at least partly below the first and second base unit connection ports.

**[0049]** In some configurations of the humidifier liquid chamber, the baffle extends from a rear of the humidifier liquid chamber to a substantially vertical face of the step.

**[0050]** In some configurations of the humidifier liquid chamber, the baffle extends from a rear of the humidifier liquid chamber towards a substantially vertical face of the step, and terminates proximal to a central axis of the humidifier liquid chamber.

**[0051]**

**[0052]** In some configurations of the humidifier liquid chamber, the humidifier liquid chamber tapers towards a centre of the humidifier liquid chamber from a base of the humidifier liquid chamber to a top of the humidifier liquid chamber.

**[0053]** In some configurations of the humidifier liquid chamber, the humidifier liquid chamber comprises a heat conductive base.

**[0054]** In some configurations of the humidifier liquid chamber, the base of the humidifier liquid chamber is removable from a body of the humidifier liquid chamber.

**[0055]** In some configurations of the humidifier liquid chamber, the humidifier liquid chamber comprises one or more base removal features to assist with removing the base of the humidifier liquid chamber from the body of the humidifier liquid chamber.

**[0056]** In some configurations of the humidifier liquid chamber, the one or more base removal features is/are located between a lower flange of the body of

**CLAIMS**

1. A humidifier liquid chamber having a generally circular peripheral shape or a humidifier liquid chamber manifold comprising:

   first and second base unit connection ports for connecting to a breathing assistance apparatus base unit, the base unit connection ports defining respective axes;

   wherein the base unit connection ports are substantially parallel to each other and are separated by a port separation distance between the axes, and the axes of the first and second base unit connection ports are configured to be in a substantially horizontal orientation when the humidifier liquid chamber or humidifier liquid chamber manifold is in use;

   wherein at least one of the base unit connection ports has a sealing depth defined by a portion of the port that is configured to overlap with a complementary chamber connection port of the base unit, wherein a ratio of the sealing depth to port separation distance is more than 0.25 and up to 0.7.

2. The humidifier liquid chamber or humidifier liquid chamber manifold according to claim 1, wherein the ratio of the sealing depth to port separation distance is between 0.3 and 0.7.

3. The humidifier liquid chamber or humidifier liquid chamber manifold according to claim 2, wherein the ratio of the sealing depth to port separation distance is 0.475.

4. The humidifier liquid chamber or humidifier liquid chamber manifold according to any one of claims 1 to 3, wherein the sealing depth is more than 10 mm.

5. The humidifier liquid chamber or humidifier liquid chamber manifold according to claim 4, wherein the sealing depth is more than 10 mm and up to 16 mm.

6. The humidifier liquid chamber or humidifier liquid chamber manifold according to claim 4, wherein the sealing depth is more than 12 mm.

7. The humidifier liquid chamber or humidifier liquid chamber manifold according to claim 6, wherein the sealing depth is more than 12 mm and up to 16 mm.

8. The humidifier liquid chamber or humidifier liquid chamber manifold according to any one of claims 1 to 7, wherein said at least one of the base unit connection ports is configured to seal with at least two seals on the complementary chamber connection port.

9. The humidifier liquid chamber or humidifier liquid chamber manifold according to any one of claims 1 to 8, wherein the base unit connection ports each have an exterior face, and wherein the exterior faces are substantially planar and are substantially perpendicular to the axes.

10. The humidifier liquid chamber manifold according to any one of claims 1 to 9, comprising first and second manifold-to-chamber connection ports for connecting to a humidifier liquid chamber, wherein the first manifold-to-chamber connection port is in fluid communication with the first base unit connection port, and wherein the second manifold-to-chamber connection port is in fluid communication with the second base unit connection port.

11. The humidifier liquid chamber manifold according to claim 10, wherein a first conduit extends between and fluidly connects the first manifold-to-chamber connection port and the first base unit connection port, and wherein a second conduit extends between and fluidly connects the second manifold-to-chamber connection port and the second base unit connection port.

12. The humidifier liquid chamber manifold according to claim 10 or 11, wherein the axes of the first and second base unit connection ports are configured to be in a substantially horizontal orientation when the humidifier liquid chamber manifold is in use.

13. The humidifier liquid chamber manifold according to claim 12, wherein axes of the first and second manifold-to-chamber connection ports are configured to be in a substantially vertical orientation when the humidifier liquid chamber manifold is in use.

14. The humidifier liquid chamber manifold according to any one of claims 9 to 13, comprising an auxiliary port that is in communication with an interior of the humidifier liquid chamber manifold.

15. The humidifier liquid chamber manifold according to any one of claims 9 to 14, comprising a conduit clip to engage with a liquid conduit for delivering liquid to the humidifier liquid chamber.

16. The humidifier liquid chamber manifold according to any one of claims 9 to 15, that is integrally formed as part of the humidifier liquid chamber.

17. The humidifier liquid chamber or humidifier liquid chamber manifold according to any one of claims 1 to 9, wherein the port separation distance is between 35 mm and 45 mm.

18. The humidifier liquid chamber or humidifier liquid chamber manifold according to claim 17, wherein the port separation distance is between 38 mm and 42 mm.

19. The humidifier liquid chamber or humidifier liquid chamber manifold according to claim 18, wherein the port separation distance is 40 mm +/- 0.6mm.

20. The humidifier liquid chamber according to any one of claims 1 to 9 or 17 to 19, comprising flow tubes extending into the humidifier liquid chamber from the first and second base unit connection ports.

21. The humidifier liquid chamber according to claim 20, wherein each flow tube comprises an opening at or adjacent an end of the flow tube that is distal from the respective base unit connection port, wherein the opening is configured to direct flow and is spaced from a wall of the humidifier liquid chamber.

22. The humidifier liquid chamber according to claim 21, wherein the opening in each flow tube faces a roof of the humidifier liquid chamber.

23. The humidifier liquid chamber according to claim 22, comprising a baffle in the interior of the humidifier liquid chamber and between the openings of the flow tubes.

24. The humidifier liquid chamber according to claim 23, wherein the baffle extends downward from the roof of the humidifier liquid chamber and terminates above a maximum liquid fill level of the humidifier liquid chamber.

25. The humidifier liquid chamber according to claim 24, wherein a distance between a bottom edge of the baffle and the maximum liquid fill level is between 5 mm and 15 mm.

26. The humidifier liquid chamber according to claim 23, wherein the baffle extends downward from the roof of the humidifier liquid chamber and terminates at or below a maximum liquid fill level of the humidifier liquid chamber.

27. The humidifier liquid chamber according to any one of claims 23 to 26, wherein the roof of the humidifier liquid chamber is sloped so as to be substantially non-horizontal in use.

28. The humidifier liquid chamber according to claim 27, wherein at least one of the roof, the baffle, and wall(s) of the humidifier liquid chamber are configured to direct gases exiting the opening of the flow tube associated with the first base unit connection port toward and over a surface of liquid in the humidifier liquid chamber.

29. The humidifier liquid chamber according to claim 28 when dependent on claim 24 or 25, comprising substantially no deadspace in the humidifier liquid chamber in use.

30. The humidifier liquid chamber according to any one of claims 20 to 29, wherein each flow tube comprises a liquid drainage aperture at or adjacent an end of the flow tube that is distal from the respective base unit connection port.

31. The humidifier liquid chamber according to any one of claims 20 to 30, wherein each flow tube comprises a gas bleed aperture in an upper surface of the flow tube.

32. The humidifier liquid chamber according to any one of claims 1 to 9 or 17 to 31, comprising a step in the humidifier liquid chamber.

33. The humidifier liquid chamber according to claim 32, wherein a base of the step is located at least partly below the first and second base unit connection ports.

34. The humidifier liquid chamber according to claim 32 or 33 when dependent on any one of claims 23 to 28, wherein the baffle extends from a rear of the humidifier liquid chamber to a substantially vertical face of the step.

35. The humidifier liquid chamber according to claim 32 or 33 when dependent on any one of claims 23 to 28, wherein the baffle extends from a rear of the humidifier liquid chamber towards a substantially vertical face of the step, and terminates proximal to a central axis of the humidifier liquid chamber.

36. The humidifier liquid chamber according to claim 35, wherein the humidifier liquid chamber tapers towards a centre of the humidifier liquid chamber from a base of the humidifier liquid chamber to a top of the humidifier liquid chamber.

37. The humidifier liquid chamber according to any one of claims 1 to 9 or 17 to 36, comprising a heat conductive base.

38. The humidifier liquid chamber according to claim 36 or 39, wherein the base of the humidifier liquid chamber is removable from a body of the humidifier liquid chamber.

39. The humidifier liquid chamber according to claim 38, comprising one or more base removal features to assist with removing the base of the humidifier liquid chamber from the body of the humidifier liquid chamber.

40. The humidifier liquid chamber according to claim 39, wherein the one or more base removal features is/are located between a lower flange of the body of the humidifier liquid chamber and an outwardly extending flange of the base of the humidifier liquid chamber.

41. The humidifier liquid chamber according to claim 40, wherein the one or more base removal features comprises a slot.

42. The humidifier liquid chamber according to any one of claims 1 to 9 or 17 to 41, comprising a shoulder between the first and second base unit connection ports.

43. The humidifier liquid chamber according to claim 42, wherein the shoulder extends beyond exterior faces of the first and second base unit connection ports.

44. The humidifier liquid chamber or humidifier liquid chamber manifold according to any one of claims 1 to 9, wherein one of the base unit connection ports is an inlet port and the other of the base unit connection ports is an outlet port.