CLAIMS

1. A desanding device for removing at least particulates from a multiple-phase fluid stream containing at least gas, liquid and entrained particulates, the desanding device comprising:

a vessel forming a treatment chamber, the treatment chamber having a fluid inlet for receiving the fluid stream adjacent an upper portion thereof and collecting particulates at a lower portion thereof;

a recovery chamber comprising a conduit fluidly connected to the treatment chamber, the conduit having

a first upper port formed through the conduit and in fluid communication with the upper portion of the treatment chamber for receiving gas therefrom,

a second lower port formed through the conduit and in fluid communication with a lower portion of treatment chamber for receiving liquid therefrom, the second lower port at an elevation below the first port, and

a fluid outlet, at an elevation intermediate the first upper and second lower ports and at an elevation lower than the fluid inlet, for discharging a particulate-free gas and a particulate-free liquid.

2. The desanding device of claim 1, wherein the conduit is external to the vessel.

3. The desanding device of claim 1, wherein the conduit is fluidly connected to the treatment chamber within the vessel at the first upper port and at the second lower port.

4. The desanding device of claim 1 or 3, wherein the conduit is located within the vessel.

5. The desanding device of any one of claims 1 to 4, wherein the treatment chamber further comprises a particulate drain for removing particulates from the lower portion of the treatment chamber.

6. The desanding device of any one of claims 1 to 5, wherein a cross-sectional area of the recovery chamber is much smaller than a cross-sectional area of the treatment chamber.

7. The desanding device of any one of claims 1 to 6, wherein a liquid interface is formed in the recovery chamber and the treatment chamber at about the elevation of the fluid outlet.

8. The desanding device of any one of claims 1 to 7, wherein the treatment chamber further comprises a flow barrier between the fluid inlet and the first upper port for directing the fluid stream thereabout.

9. The desanding device of any one of claims 1 to 8, wherein a first portion of the recovery chamber is external to the vessel and fluidly connected to the treatment chamber within the vessel at the first upper port and a second portion of the recovery chamber is located within the vessel and fluidly connected to the treatment chamber within the vessel at the second lower port.

10. The desanding device of any one of claims 1 to 4 or any one of claims 6 to 9, wherein the treatment chamber further comprises a particulate drain for removing particulate from the lower portion of said treatment chamber, the particulate drain comprising a sand accumulation chamber sandwiched between an inlet valve and a discharge valve for forming an airlock.

11. The desanding device of claim 10 further comprising a particulate detector to detect particulate accumulation in the sand accumulation chamber through the inlet valve and to periodically open and close the particulate drain.

12. The desanding device of claim 10, wherein the inlet and discharge valves are controlled automatically with a timer or a particulate detector to periodically open and close the discharge valve.

13. The desanding device of claim 1 of 3, wherein the conduit is external to the vessel and fluidly connected to the treatment chamber within the vessel at the first upper port and at the second lower port.

14. The desanding device of claim 13, wherein the conduit comprises a vertically oriented conduit portion extending upwardly from the second lower port and to the fluid outlet.

15. The desanding device of any one of claims 1 to 14, wherein the treatment chamber has a bottom wall at an angle of between about 25 and about 90°.

16. The desanding device of any one of claims 1 to 15, wherein the treatment chamber has a bottom wall at or greater than an angle of repose of the particulates accumulated therein.

17. The desanding device of claim 1 or any one of claims 3 to 12, wherein the conduit comprises a baffle in the vessel that divides the vessel into a treatment chamber and the recovery chamber, the first upper port and the second lower port formed through the baffle.

18. The desanding device of claim 17, wherein the fluid outlet extends downwardly into the recovery chamber to an elevation intermediate the first upper port and the second lower port.

19. A device for removing at least particulates from a multiple-phase fluid stream containing gas, liquid and entrained particulates comprising:

a fluid inlet at an upper portion of a vessel for receiving the fluid stream, the fluid inlet extending into the vessel to a discharge end;

a gas outlet at the upper portion of the vessel, the gas outlet at an elevation at or above the fluid inlet's discharge end;

a liquid outlet from the vessel; and

a shroud within the vessel, the shroud comprising a conduit forming a treatment chamber within, and a recovery chamber between the conduit and the vessel,

the treatment chamber having an upper opening in fluid communication with the upper portion of the recovery chamber of the vessel and a lower opening in fluid communication with a lower portion of the recovery chamber at an elevation below the liquid outlet, the upper opening receiving the fluid inlet therein with the fluid inlet's discharge end within the conduit intermediate the upper and lower openings, the fluid inlet forming a shroud annulus at the upper opening between the fluid inlet and the conduit,

the conduit receiving the fluid stream from the discharge end of the fluid inlet into the treatment chamber and flowing gas out of the treatment chamber through the shroud annulus and into the upper portion of the vessel for discharge through the gas outlet, and flowing liquid and particulates out of the treatment chamber through the lower opening into the lower portion of the vessel, the liquid flowing to the liquid outlet.

20. The device of claim 19 or 20, wherein the liquid outlet is spaced from the gas outlet and at an elevation therebelow, the device further comprising:

a liquid level controller for controlling a liquid level at about or below a discharge end of the fluid inlet.

21. The device of claim 19 or 20, wherein:

the recovery chamber has a first, upper port in fluid communication with the conduit's upper opening for receiving gas therefrom, and a second, lower port in fluid communication with the conduit's lower opening, the fluid outlet intermediate the first upper and second lower ports for discharging at least particulate-removed gas.

22. The device of claim 21, wherein the fluid outlet is a liquid/gas outlet for both the liquid outlet and the gas outlet.

23. The device of claim 21, wherein the conduit of the recovery chamber is external to the vessel and in fluid communication with the treatment chamber via the first and second ports.

24. The device of any one of claims 19 to 23, wherein the fluid outlet is at an elevation lower than the discharge end of the fluid inlet.

25. The device of any one of claims 19 to 24, wherein the vessel comprises a bottom wall, and the conduit extends along the bottom wall, said bottom wall having a non-zero inclination angle α with respect to a horizontal plane.

26. The device of any one of claims 19 to 25, wherein the vessel further comprises a particulate drain for removing particulates from said treatment chamber.

27. The device of claim 26, wherein the particulate drain comprises a horizontally-oriented body.

28. The device of any one of claims 19 to 27, wherein a freeboard interface between liquid and gas is formed in the recovery chamber and in the treatment chamber at the elevation of the fluid outlet.

29. The device of claim 28, wherein the fluid inlet extends to an elevation within the vessel such that a discharge end of the fluid inlet is at about the freeboard interface.

30. The device of claim 26 or 27, wherein the particulate drain is located at the lower portion of the vessel.