WHAT IS CLAIMED

1. A vessel (10) for treating an oil-in-water inlet stream, the vessel (10) extending in a longitudinal direction and housing:

an inlet flow distributor (21) arranged to direct an inlet flow toward a perforated baffle (31) of a coalescing section (30), the coalescing section (30) housing a packing (33) and being arranged upstream of a second baffle (31);

a flotation section (50) arranged to receive a flow exiting the coalescing section (30), the flotation section (50) being divided by one or more perforated baffles (55); and

an outlet water collecting pipe (61) arranged to receive a flow exiting the flotation section (50), the outlet water collecting pipe (61) having one or more openings located along its length.

2. A vessel (10) according to claim 1 further comprising the coalescing section (30) being divided into a first (37) and a second section (39).

3. A vessel (10) according to claim 2 further comprising the packing of the first section (37) being a different pre-selected packing than the packing of the second section (39).

4. A vessel (10) according to claim 3 wherein the packing of the first section (37) is a different size than the packing of the second section (39).

5. A vessel (10) according to claim 3 wherein the packing of the first section (37) is a different material than the packing of the second section (39).

6. A vessel (10) according to claim 1 wherein the packing is selected from the group consisting of coalescing balls and coalescing rings.

7. A vessel (10) according to claim 1 further comprising a solid baffle (43) arranged after the second baffle (31), the second baffle (31) being a perforated baffle.

8. A vessel (10) according to claim 1 further comprising the inlet flow distributor (21) arranged to first direct the incoming flow away from the perforated baffle (31) of the coalescing section.

9. A vessel (10) according to claim 8 further comprising the inlet flow distributor (21) including a half-pipe (25) arranged to redirect the incoming flow toward the perforated baffle (31) of the coalescing section.

10. A vessel (10) according to claim 1 further comprising the vessel (10) including a solids removal device (41).

11. A vessel (10) according to claim 10 wherein the solids removal device (41) creates a cyclonic flow about the solids removal device (41).

12. A vessel (10) according to claim 1 further comprising the flotation section (50) including a gas-inducing device (53).

13. A vessel (10) according to claim 1 wherein a flow rate through the vessel (10) is in a range of 1 ft/min to 10 ft/min (0.3048 m/min to 3.048 m/min).

14. A vessel (10) according to claim 12 wherein the flow rate is in a range of 2 ft/min to 5 ft/min (0.6096 m/min to 1.524 m/min).

15. A vessel (10) for treating an oil-in-water inlet stream, the vessel extending in a longitudinal direction and housing:

an inlet flow distributor arranged to direct an inlet flow toward a perforated baffle (31) of a coalescing section (30), the coalescing section (30) housing a first and a second packing (33) and being arranged upstream of a second baffle (31), the packing of the first section (37) being a different pre-selected packing than the packing of the second section (39);

a flotation section (50) arranged to receive a flow exiting the coalescing section (30), the flotation section (50) being divided by one or more perforated baffle (55); and

an outlet water collecting pipe (61) arranged to receive a flow exiting the flotation section (50), the outlet water collecting pipe (61) having one or more openings located along its length.

16. A vessel (10) according to claim 15 wherein the first packing and the second different packing are a different size.

17. A vessel (10) according to claim 15 wherein the first packing and the second different packing are a different material.

18. A vessel (10) according to claim 15 further comprising a solid baffle (43) arranged after the second baffle (31), the second baffle (31) being a perforated baffle.

19. A method of treating an oil-in-water stream the method comprising the steps of routing the oil-in-water stream to a vessel (10) extending in the longitudinal direction and housing:

an inlet flow distributor (21) arranged to direct an inlet flow toward a perforated baffle (31) of a coalescing section (30), the coalescing section (30) housing a packing (33/35) and being arranged upstream of a second baffle (31);

a flotation section (50) arranged to receive a flow exiting the coalescing section (30), the flotation section (50) being divided by one or more perforated baffles (55); and

an outlet water collecting pipe (61) arranged to receive a flow exiting the flotation section (50), the outlet water collecting pipe (61) having one or more openings located along its length.

20. A method according to claim 19 wherein the coalescing section (30) is divided into a first (37) and a second (39) section, the packing of the first section (37) being a different pre-selected packing than the packing of the second section (39).

5

21. A method according to claim 20 wherein the packing of the first (37) and second (39) sections differ in at least size.

CLAIMS

What is claimed:

1. A vessel for treating an oil-in-water inlet stream, the vessel being elongated in a horizontal longitudinal direction and further comprising within an interior of the vessel:

an inlet flow distributor connected to an inlet of the vessel and extending left and right of the inlet parallel to the horizontal longitudinal direction of the vessel;

a coalescing section located downstream of the inlet flow distributor in a horizontal lateral direction of the vessel between a perforated baffle and a second baffle and extending about a same length as the inlet distributor in the horizontal longitudinal direction of the vessel;

a gas flotation section located downstream of the second baffle in the horizontal lateral direction of the vessel and extending about the same length as the coalescing section in the horizontal longitudinal direction of the vessel; and

an outlet water collecting pipe arranged to receive a flow exiting the gas flotation section, the outlet water collecting pipe having one or more openings located along its length;

the inlet flow distributor being arranged to direct an inlet flow to the vessel in the horizontal lateral direction across the vessel, the inlet flow within the vessel remaining a horizontal flow through the coalescing and gas flotation sections.

2. A vessel according to claim 1 further comprising the coalescing section being divided into a first and a second section.

3. A vessel according to claim 2 further comprising the coalescing section including a packing, the packing of the first section being a different packing than the packing of the second section.

4. A vessel according to claim 3 wherein the packing of the first section is a different size than the packing of the second section.

5. A vessel according to claim 3 wherein the packing of the first section is a different material than the packing of the second section.

6. A vessel according to claim 1 wherein the packing is selected from the group consisting of coalescing balls and coalescing rings.

7. A vessel according to claim 1 further comprising a solid baffle arranged after the second baffle, the second baffle being a perforated baffle.

8. A vessel according to claim 1 further comprising the inlet flow distributor arranged to first direct the incoming flow away from the perforated baffle of the coalescing section.

9. A vessel according to claim 8 further comprising the inlet flow distributor including a half-pipe arranged to redirect the incoming flow toward the perforated baffle of the coalescing section.

10. A vessel according to claim 1 further comprising the vessel including a solids removal device.

11. A vessel according to claim 10 wherein the solids removal device creates a cyclonic flow about the solids removal device.

12. A vessel according to claim 1 further comprising the gas flotation section including a gas-inducing device.

13. A vessel according to claim 1 wherein a flow rate through the vessel is in a range of 1 ft/min to 10 ft/min (0.3048 m/min to 3.048 m/min).

14. A vessel according to claim 13 wherein the flow rate is in a range of 2 ft/min to 5 ft/min (0.6096 m/min to 1.524 m/min).

15. A vessel for treating an oil-in-water inlet stream, the vessel extending in a horizontal longitudinal direction and comprising within an interior of the vessel:

an inlet flow distributor arranged parallel to the horizontal longitudinal direction of the vessel to direct an inlet flow across the vessel in a horizontal lateral direction toward a perforated baffle of a coalescing section, the coalescing section being arranged immediately downstream of the inlet flow distributor in the horizontal lateral direction and immediately upstream of a second baffle;

a gas flotation section arranged downstream of the second baffle in the horizontal lateral direction to receive a horizontal flow exiting the coalescing, the gas flotation section being divided by one or more perforated baffles; and

an outlet water collecting pipe arranged to receive a horizontal flow exiting the gas flotation section, the outlet water collecting pipe having one or more openings located along its length.

16. A vessel according to claim 15 further comprising the coalescing section housing a first and a second packing, wherein the first packing and the second different packing are a different size.

17. A vessel according to claim 16 wherein the first packing and the second different packing are a different material.

18. A vessel according to claim 15 further comprising a solid baffle arranged after the second baffle, the second baffle being a perforated baffle.

19. A method of treating an oil-in-water stream the method comprising the step of flowing in a horizontal direction the oil-in-water stream through a vessel, the vessel being elongated in a horizontal longitudinal direction and housing:

an inlet flow distributor extending parallel to the horizontal longitudinal direction of the vessel and arranged to direct an inlet flow to the vessel in a horizontal lateral direction across the vessel and toward a perforated baffle of a coalescing section, the coalescing section being arranged downstream of the inlet flow distributor in a horizontal lateral direction of the vessel and extending in the

horizontal longitudinal direction of the vessel and being arranged upstream of a second baffle;

a gas flotation section extending in the horizontal longitudinal direction of the vessel and arranged downstream of the coalescing section in the horizontal lateral direction of the vessel to receive a horizontal flow exiting the coalescing section, the gas flotation section being divided by one or more perforated baffles; and

an outlet water collecting pipe arranged to receive a horizontal flow exiting the gas flotation section, the outlet water collecting pipe having one or more openings located along its length.

20. A method according to claim 19 wherein the coalescing section includes a packing and is divided into a first and a second section, a packing of the first section being a different pre-selected packing than a packing of the second section.

21. A method according to claim 20 wherein the packing of the first and second sections differ in size.

22. A vessel according to claim 1 further comprising the coalescing section including a packing.