CLAIMS

What is claimed is:

1. A fuel separation apparatus comprising:

a first fuel storage vessel having an outlet;

a second fuel storage vessel having an inlet;

a pipe having a first inlet end in fluid communication with the outlet of the first fuel storage vessel and a second outlet end in fluid communication with the inlet of the second fuel storage vessel, the pipe having a plurality of curvilinear pipe loops at least a portion of which plurality of curvilinear pipe loops are of the same diameter, and arranged adjacent one another along a substantially vertical axis extending from a first upper axis end to a second lower axis end such that said pipe loops are adjacent one another in a vertically stacked arrangement, each pipe loop characterized by an inner wall and an outer wall;

an outlet port disposed along the pipe between the two ends, said outlet port defining a junction between said pipe and a separator inlet line, wherein said separator inlet line is connected to said outlet port; and

a gas-liquid separator in fluid communication with the outlet port through said separator inlet line such that fluid is capable of flowing into said gas-liquid separator through said separator inlet line.

2. The apparatus of claim 1, wherein each of the loops is substantially horizontal.

3. The apparatus of claim 1, further comprising a liquid return line fluidly coupled between a liquid exit of the gas separator and the pipe, a return junction formed between the liquid return line and the pipe between the outlet port and the inlet of the second fuel storage vessel.

4. The apparatus of claim 1, further comprising a restriction in the pipe between the outlet port and the return junction.

5. The apparatus of claim 1, wherein at least one of the first fuel storage vessel and the second fuel storage vessel comprises a bunkering barge.

6. A fuel separation apparatus comprising;

a bunkering barge holding a first fuel storage tank having an outlet;

a ship holding a second fuel storage tank having an inlet;

a flow shaping line having a first end in fluid communication with the outlet of the first fuel storage tank and a second end in fluid communication with the inlet of the second fuel storage tank, the flow shaping line having a plurality of curvilinear pipe loops arranged adjacent one another along an axis extending from a first axis end to a second axis end, each pipe loop characterized by an inner wall and an outer wall;

an outlet port disposed along the pipe between the two ends;

a separator inlet line coupled to the outlet port such that the outlet port defines a junction between the separator inlet line and the flow shaping line; and

a gas separator in fluid communication with said outlet port through said separator inlet line such that fluid is capable of flowing into said gas separator through said separator inlet line.

7. The fuel separation apparatus of claim 6, wherein each of the loops is disposed in a horizontal orientation.

8. The fuel separation apparatus of claim 6, wherein the axis extends in a substantially vertical direction.

9. The fuel separation apparatus of claim 6, wherein each curvilinear pipe loop is characterized by a diameter, and wherein the diameter of at least one curvilinear pipe loop is the same as the diameter of at least another adjacent curvilinear pipe loop.

10. The fuel separation apparatus of claim 6, further comprising a liquid-liquid phase splitter, the liquid-liquid phase splitter comprising a first horizontal inlet connected to the second end of

the flow shaping line downstream of said junction such that fluid is capable of flowing into said liquid-liquid phase splitter through the second end of the flow shaping line, and wherein the liquid-liquid phase splitter further comprises a first outlet connected to the second fuel storage tank, a second outlet and a first separation mechanism disposed between the first and second outlets.

11. A fuel separation method, comprising:

delivering fuel in a first fuel storage tank to a second fuel storage tank;

flowing the fuel from the first fuel storage tank into a first end of a flow shaping line and through a plurality of curvilinear pipe loops defined in the flow shaping line arranged adjacent one another along an axis extending from a first axis end to a second axis end;

utilizing the curvilinear pipe loops to stratify the fuel into a primarily liquid component and a primarily gas component;

diverting the primarily gas component from the flow shaping line to a gas separator through an outlet port disposed along the flow shaping line; and

flowing the primarily liquid component through a second end of the flow shaping line downstream of the outlet port and into the second fuel storage tank.

12. The fuel separation method of claim 11, further comprising pumping the fuel from the first fuel storage tank to the second fuel storage tank through the flow shaping line.

13. The fuel separation method of claim 12, wherein separating the gas from the fuel further comprises separating air pumped from the first fuel storage tank with the fuel.

14. The fuel separation method of claim 12, further comprising measuring a property of the fuel within the flow shaping line.

15. The fuel separation method of claim 11, further comprising returning a liquid from the gas separator to the flow shaping line downstream of the outlet port.

16. The fuel separation method of claim 15, further comprising restricting the liquid from the fuel between the outlet port and the second end of the flow shaping line to thereby accelerate the liquid from the gas separator.