We Claim:

1. A phase separation apparatus for separating a two-phase fluid flow into a liquid phase portion and a vapor phase portion, comprising:

a shell having an upper end cap and a lower end cap and defining an interior volume having an upper region, a lower region and a central region between the upper region and the lower region;

an auger assembly disposed within the interior volume defined by said shell, the auger assembly having an elongated support tube extending along a central vertical axis of said shell and a helical spiral member extending about said support tube and defining in association with said shell a continuous spiral fluid flow passage within the interior volume;

a vapor outlet penetrating through the upper end cap to open in fluid communication with the upper region of the interior volume; and

a liquid outlet penetrating through the lower end cap from a side face of the lower end cap to open through an upper surface of the lower end cap in fluid communication with the lower region of the interior volume.

2. The phase separation apparatus as recited in claim 1 wherein said support tube has an open upper end and at least one flow outlet in a sidewall of said support tube spaced from the open upper end and opening into the central region of the interior volume.

3. The phase separation apparatus as recited in claim 2 further comprising a fluid inlet penetrating through the upper end cap to open in fluid communication into the open upper end of said support tube.

4. The phase separation apparatus as recited in claim 1 further comprising a fluid inlet tube penetrating the upper end cap and extending into the interior volume to open into a central region of the continuous spiral fluid flow passage within the interior volume.

5. The phase separation apparatus as recited in claim 4 wherein the fluid inlet tube is configured within the interior volume so as to discharge received fluid into the continuous spiral fluid flow passage generally tangentially to a circumferentially directed path.

6. A phase separation apparatus for separating a two-phase fluid flow into a liquid phase portion and a vapor phase portion, comprising:

a shell having an upper end cap and a lower end cap and defining an interior volume having an upper region, a lower region and a central region between the upper region and the lower region;

an auger assembly disposed within the interior volume defined by said shell, the auger assembly having an elongated support tube extending along a central vertical axis of said shell and a helical spiral member extending about said support tube and defining in association with said shell a continuous spiral fluid flow passage within the interior volume, said support tube having an open upper end and at least one flow outlet in a sidewall of said support tube spaced from the open upper end and opening into the central region of the interior volume;

a vapor outlet penetrating through the upper end cap to open in fluid communication with the upper region of the interior volume;

a liquid outlet penetrating through the lower end cap to open through an upper surface of the lower end cap in fluid communication with the lower region of the interior volume; and

a fluid inlet penetrating through the upper end cap to open in fluid communication into the open upper end of said support tube.

7. The phase separation apparatus as recited in claim 6 wherein the at least one outlet in a sidewall of said support tube comprises a oblong hole having a longitudinal dimension and a lateral dimension, the longitudinal dimension being greater than the lateral dimension.

8. The phase separation apparatus as recited in claim 6 wherein said at least one outlet in a sidewall of said support tube comprises a pair of diametrically opposed openings in the sidewall of said support tube.

9. The phase separation apparatus as recited in claim 6 wherein said fluid inlet tube has a first internal diameter and said support tube has a second internal diameter, the second internal diameter being greater than the first internal diameter.

10. The phase separation apparatus as recited in claim 9 wherein the at least one outlet defines a first flow area and said support tube defines a second flow area, the first flow area being greater than the second flow area.

11. The phase separation apparatus as recited in claim 6 further comprising a flow stopper disposed within said support tube at a position subadjacent the at least one outlet.

12. A phase separation apparatus for separating a two-phase fluid flow into a liquid phase portion and a vapor phase portion, comprising:

a shell having an upper end cap and a lower end cap and defining an interior volume having an upper region, a lower region and a central region between the upper region and the lower region;

an auger assembly disposed within the interior volume defined by said shell, the auger assembly having an elongated support tube extending along a central vertical axis of said shell and a helical spiral member extending about said support tube and defining in association with said shell a continuous spiral fluid flow passage within the interior volume;

a vapor outlet penetrating through the upper end cap to open in fluid communication with the upper region of the interior volume;

a liquid outlet penetrating through the lower end cap to open through an upper surface of the lower end cap in fluid communication with the lower region of the interior volume; and

a fluid inlet tube penetrating the upper end cap and extending into the interior volume to open into a central region of the continuous spiral fluid flow passage within the interior volume.

13. The phase separation apparatus as recited in claim 12 wherein the fluid inlet tube is configured within the interior volume so as to discharge received fluid into the continuous spiral fluid flow passage generally tangentially to a circumferentially directed path.

Claims

1. A phase separation apparatus (60) for separating a two-phase fluid flow into a liquid phase portion and a vapor phase portion, comprising :

a shell (80) having an upper end cap (84) and a lower end cap (86) and defining an interior volume having an upper region, a lower region and a central region between the upper region and the lower region;

an auger assembly (90) disposed within the interior volume defined by said shell (80), the auger assembly (90) having an elongated support tube (92) extending along a central vertical axis of said shell (80) and a helical spiral member (94) extending about said support tube (92) and defining in association with said shell (80) a continuous spiral fluid flow passage (95) within the interior volume, said support tube (92) having an open upper end;

a vapor outlet (66) penetrating through the upper end cap (84) to open in fluid communication with the upper region of the interior volume;

a liquid outlet (64) penetrating through the lower end cap (86) to open through an upper surface of the lower end cap (86) in fluid communication with the lower region of the interior volume; and

a fluid inlet (62) penetrating through the upper end cap (84) to open in fluid communication into the open upper end of said support tube (92);

characterized in that

said support lube (92) has at least one flow outlet (98) in a sidewall of said support tube (92) spaced from the open upper end and opening into the central region of the interior volume.

2. The phase separation apparatus (60) as recited in claim 1 wherein the at least one outlet (98) in a sidewall of said support tube (92) comprises a oblong hole (98) having a longitudinal dimension and a lateral dimension, the longitudinal dimension being greater than the lateral dimension.

3. The phase separation apparatus (60) as recited in claim 1 wherein said at least one outlet (98) in a sidewall of said support tube (92) comprises a pair of diametrically opposed openings (98) in the sidewall of said support tube (92).

4. The phase separation apparatus (60) as recited in claim 1 wherein said fluid inlet (62) tube has a first internal diameter and said support tube (92) has a second internal diameter, the second internal diameter being greater than the first internal diameter.

5. The phase separation apparatus (60) as recited in claim 4 wherein the at least one outlet (98) defines a first flow area and said support tube (92) defines a second flow area, the first flow area being greater than the second flow area.

6. The phase separation apparatus (60) as recited in claim 1 further comprising a flow stopper (99) disposed within said support tube (92) at a position subadjacent the at least one outlet (98).

7. A phase separation apparatus (60) for separating a two-phase fluid flow into a liquid phase portion and a vapor phase portion, comprising:

a shell (80) having an upper end cap (84) and a lower end cap (86) and defining an interior volume having an upper region, a lower region and a central region between the upper region and the lower region;

an auger assembly (90) disposed within the interior volume defined by said shell (80), the auger assembly (90) having an elongated support tube (92) extending along a central vertical axis of said shell (80) and a helical spiral member (94) extending about said support tube (92) and defining in association with said shell (80) a continuous spiral fluid flow passage (95) within the interior volume;

a vapor outlet (66) penetrating through the upper end cap (84) to open in fluid communication with the upper region of the interior volume;

a liquid outlet (64) penetrating through the lower end cap (86) to open through an upper surface of the lower end cap (86) in fluid communication with the lower region of the interior volume; and

a fluid inlet tube (62) penetrating the upper end cap (84) and extending into the interior volume

characterized in that said fluid in let tube (62) opens into a central region of the continuous spiral fluid flow passage (95) within the interior volume .

8. The phase separation apparatus (60) as recited in claim 7 wherein the fluid inlet tube (62) is configured within the interior volume so as to discharge received fluid into the continuous spiral fluid flow passage (95) generally tangentially to a circumferentially directed path.