CLAIMS

1. A liquid distributor for distribution of a liquid in a mass transfer column, comprising:

at least one riser comprising at least one riser wall, wherein the at least one riser wall extends from a first surface of the liquid distributor in a first direction of the mass transfer column;

at least one shield, wherein the at least one shield extends from a second surface of the liquid distributor opposite the first surface and extending in a second direction of the mass transfer column opposite the first direction; and

at least one liquid distribution aperture extending from the first surface of the liquid distributor through the second surface of the liquid distributor,

wherein the at least one shield has a length extending in the second direction such that a gap is created between the at least one shield and a packing, and wherein the height of the gap between the shield and the packing is about 10 mm to 75 mm.

2. The liquid distributor of claim 1, wherein the mass transfer column is an air separation column.

3. The liquid distributor of claim 1, wherein the packing is structured packing.

4. The liquid distributor of claim 1, wherein the height of the gap between the shield and the packing is about 40 mm to 50 mm.

5. The liquid distributor of claim 1, wherein the at least one shield is positioned such that the at least one shield extends from the second surface equidistant from the at least one liquid distribution aperture and the at least one riser.

6. The liquid distributor of claim 1, wherein the at least one shield is positioned such that the at least one shield extends from the second surface directly adjacent to the at least one riser.

7. The liquid distributor of claim 1, wherein the at least one riser extends substantially across the entire cross-section of the mass transfer column in a third direction perpendicular to the first direction and the second direction, and wherein the at least one shield extends across the entire cross-section of the mass transfer column in the third direction.

8. The liquid distributor of claim 1, wherein the at least one riser extends substantially across the entire cross-section of the mass transfer column in a third direction perpendicular to the first direction and the second direction, and wherein the at least one shield extends substantially across the entire cross-section of the mass transfer column in the third direction.

9. A method for the distribution of a liquid in a mass transfer column, comprising the steps of:

a. introducing the liquid into an upper portion of the mass transfer column;

b. positioning within the mass transfer column at least one mass transfer column section;

c. positioning within the at least one mass transfer column section a liquid distributor to receive a downwardly flowing stream of liquid and an upwardly flowing stream of vapor, the liquid distributor comprising:

i. at least one riser comprising at least one riser wall, wherein the at least one riser wall extends upwardly from a first surface of the liquid distributor;

ii. at least one shield, wherein the at least one shield extends from a second surface of the liquid distributor opposite the first surface and extending downwardly; and

iii. at least one liquid distribution aperture extending from the first surface of the liquid distributor through the second surface of the liquid distributor,

wherein the at least one shield has a length extending downwardly such that a gap is created between the at least one shield and a packing positioned below the liquid distributor in the mass transfer column, and wherein the height of the gap between the shield and the packing is about 10 mm to 75 mm,

d. collecting the downwardly flowing stream of liquid from the upper portion of the mass transfer column on the first surface of the liquid distributor;

e. passing the upwardly flowing stream of vapor from the lower portion of the mass transfer column through the risers of the liquid distributor; and

f. distributing the downwardly flowing stream of liquid from at least one liquid distribution aperture in the liquid distributor on to the packing.

10. The method of claim 9, wherein the mass transfer column is an air separation column.

11. The method of claim 9, wherein the packing is structured packing.

12. The method of claim 9, wherein the height of the gap between the shield and the packing is about 40 mm to 50 mm.

13. The method of claim 9, wherein the at least one shield is positioned such that the at least one shield extends from the second surface equidistant from the at least one liquid distribution aperture and the at least one riser.

14. The method of claim 9, wherein the at least one shield is positioned such that the at least one shield extends from the second surface directly adjacent to the at least one riser.

AMENDED CLAIMS
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1. A liquid distributor for distribution of a liquid in a mass transfer column, comprising:

at least one riser comprising at least one riser wall, wherein the at least one riser wall extends from a first surface of the liquid distributor in a first direction of the mass transfer column;

at least one shield, wherein the at least one shield extends from a second surface of the liquid distributor opposite the first surface and extending in a second direction of the mass transfer column opposite the first direction; and

at least one liquid distribution aperture extending from the first surface of the liquid distributor through the second surface of the liquid distributor,

wherein the at least one shield has a length extending in the second direction such that a gap is created between the at least one shield and a packing, and wherein the height of the gap between the shield and the packing is about 10 mm to 75 mm.

2. The liquid distributor of claim 1, wherein the mass transfer column is an air separation column.

3. The liquid distributor of claim 1, wherein the packing is structured packing.

4. The liquid distributor of claim 1, wherein the height of the gap between the shield and the packing is about 40 mm to 50 mm.

5. The liquid distributor of claim 1, wherein the at least one shield is positioned such that the at least one shield extends from the second surface equidistant from the at least one liquid distribution aperture and the at least one riser.

6. The liquid distributor of claim 1, wherein the at least one shield is positioned such that the at least one shield extends from the second surface directly adjacent to the at least one riser.

7. The liquid distributor of claim 1, wherein the at least one riser extends substantially across the entire cross-section of the mass transfer column in a third direction perpendicular to the first direction and the second direction, and wherein the at least one shield extends across the entire cross-section of the mass transfer column in the third direction.

8. The liquid distributor of claim 1, wherein the at least one riser extends substantially across the entire cross-section of the mass transfer column in a third direction perpendicular to the first direction and the second direction, and wherein the at least one shield extends substantially across the entire cross-section of the mass transfer column in the third direction.

9. The liquid distributor of claim 1, wherein the at least one liquid distribution aperture is located between the at least one shield and an outer wall of the mass transfer column.

10. The liquid distributor of claim 1, wherein the at least one liquid distribution aperture is located at a bottom of the liquid distributor and the at least on shield extends in the second direction from the bottom of the liquid distributor.

11. The liquid distributor of claim 1, wherein the liquid distributor comprises a trough style or plate style distributor.

12. A method for the distribution of a liquid in a mass transfer column, comprising the steps of:

a. introducing the liquid into an upper portion of the mass transfer column;

b. positioning within the mass transfer column at least one mass transfer column section;

c. positioning within the at least one mass transfer column section a liquid distributor to receive a downwardly flowing stream of liquid and an upwardly flowing stream of vapor, the liquid distributor comprising:

i. at least one riser comprising at least one riser wall, wherein the at least one riser wall extends upwardly from a first surface of the liquid distributor;

ii. at least one shield, wherein the at least one shield extends from a second surface of the liquid distributor opposite the first surface and extending downwardly; and

iii. at least one liquid distribution aperture extending from the first surface of the liquid distributor through the second surface of the liquid distributor,

wherein the at least one shield has a length extending downwardly such that a gap is created between the at least one shield and a packing positioned below the liquid distributor in the mass transfer column, and wherein the height of the gap between the shield and the packing is about 10 mm to 75 mm,

d. collecting the downwardly flowing stream of liquid from the upper portion of the mass transfer column on the first surface of the liquid distributor;

e. passing the upwardly flowing stream of vapor from the lower portion of the mass transfer column through the risers of the liquid distributor; and

f. distributing the downwardly flowing stream of liquid from at least one liquid distribution aperture in the liquid distributor on to the packing.

13. The method of claim 12, wherein the mass transfer column is an air separation column.

14. The method of claim 12, wherein the packing is structured packing.

15. The method of claim 12, wherein the height of the gap between the shield and the packing is about 40 mm to 50 mm.

16. The method of claim 12, wherein the at least one shield is positioned such that the at least one shield extends from the second surface equidistant from the at least one liquid distribution aperture and the at least one riser.

17. The method of claim 12, wherein the at least one shield is positioned such that the at least one shield extends from the second surface directly adjacent to the at least one riser.

18. The method of claim 12, further comprising:

g. creating a create static pressure zone located between the at least on shield and an outer wall of the mass transfer column, the static pressure zone having a low vapor velocity than the at least one riser and the at least one liquid distribution aperture being located between the at least one shield and the outer wall.

CLAIMS

1. A liquid distributor for distribution of a liquid in a mass transfer column, comprising:

at least one riser comprising at least one riser wall, wherein the at least one riser wall extends from a first surface of the liquid distributor in a first direction of the mass transfer column;

at least one shield, wherein the at least one shield extends from a second surface of the liquid distributor opposite the first surface and extending in a second direction of the mass transfer column opposite the first direction; and

at least one liquid distribution aperture extending from the first surface of the liquid distributor through the second surface of the liquid distributor,

wherein the at least one shield has a length extending in the second direction such that a gap is created between the at least one shield and a packing, and wherein the height of the gap between the shield and the packing is about 10 mm to 75 mm, and

wherein the liquid distributor comprises a trough style or plate style distributor.

2. The liquid distributor of claim 1, wherein the mass transfer column is an air separation column.

3. The liquid distributor of claim 1, wherein the packing is structured packing.

4. The liquid distributor of claim 1, wherein the height of the gap between the shield and the packing is about 40 mm to 50 mm.

5. The liquid distributor of claim 1, wherein the at least one shield is positioned such that the at least one shield extends from the second surface equidistant from the at least one liquid distribution aperture and the at least one riser.

6. The liquid distributor of claim 1, wherein the at least one shield is positioned such that the at least one shield extends from the second surface directly adjacent to the at least one riser.

7. The liquid distributor of claim 1, wherein the at least one riser extends substantially across the entire cross-section of the mass transfer column in a third direction perpendicular to the first direction and the second direction, and wherein the at least one shield extends across the entire cross-section of the mass transfer column in the third direction.

8. The liquid distributor of claim 1, wherein the at least one riser extends substantially across the entire cross-section of the mass transfer column in a third direction perpendicular to the first direction and the second direction, and wherein the at least one shield extends substantially across the entire cross-section of the mass transfer column in the third direction.

9. The liquid distributor of claim 1, wherein the at least one liquid distribution aperture is located between the at least one shield and an outer wall of the mass transfer column.

10. The liquid distributor of claim 1, wherein the at least one liquid distribution aperture is located at a bottom of the liquid distributor and the at least one shield extends in the second direction from the bottom of the liquid distributor.

11. A method for the distribution of a liquid in a mass transfer column, comprising the steps of:

a. introducing the liquid into an upper portion of the mass transfer column;

b. positioning within the mass transfer column at least one mass transfer column section;

c. positioning within the at least one mass transfer column section a liquid distributor to receive a downwardly flowing stream of liquid and an upwardly flowing stream of vapor, the liquid distributor comprising:

i. at least one riser comprising at least one riser wall, wherein the at least one riser wall extends upwardly from a first surface of the liquid distributor;

ii. at least one shield, wherein the at least one shield extends from a second surface of the liquid distributor opposite the first surface and extending downwardly; and

iii. at least one liquid distribution aperture extending from the first surface of the liquid distributor through the second surface of the liquid distributor,

wherein the at least one shield has a length extending downwardly such that a gap is created between the at least

one shield and a packing positioned below the liquid distributor in the mass transfer column, and wherein the height of the gap between the shield and the packing is about 10 mm to 75 mm, and

wherein the liquid distributor comprises a trough style or plate style distributor,

d. collecting the downwardly flowing stream of liquid from the upper portion of the mass transfer column on the first surface of the liquid distributor;

e. passing the upwardly flowing stream of vapor from the lower portion of the mass transfer column through the risers of the liquid distributor; and

f. distributing the downwardly flowing stream of liquid from at least one liquid distribution aperture in the liquid distributor on to the packing.

12. The method of claim 11, wherein the mass transfer column is an air separation column.

13. The method of claim 11, wherein the packing is structured packing.

14. The method of claim 11, wherein the height of the gap between the shield and the packing is about 40 mm to 50 mm.

15. The method of claim 11, wherein the at least one shield is positioned such that the at least one shield extends from the second surface equidistant from the at least one liquid distribution aperture and the at least one riser.

16. The method of claim 11, wherein the at least one shield is positioned such that the at least one shield extends from the second surface directly adjacent to the at least one riser.

17. The method of claim 11, further comprising:

g. creating a static pressure zone located between the at least one shield wall and an outer wall of the mass transfer column, the static pressure zone having a lower vapor velocity than the at least one vapor riser

and the at least one liquid distribution aperture being located between the at least one shield and the outer wall.