A further object of certain embodiments of the present invention is to facilitate ideal mixing of the gas produced by flashing of a feed uniformly with gas coming from a separation section below the feed inlet section.

In accordance with the present disclosure, there is provided a contacting column section comprising a feed distribution device comprising;

- a feed line inlet for introducing a feed which is at least partially liquid to the feed distribution device,
- a chamber between the feed line inlet and the column, said chamber having a cross-sectional area,
- a means for causing the flow to be in choked condition and to simultaneously at least partially vaporize before entering the interior portion of the section of the column; and
- wherein the chamber at least partially surrounds a portion of the outer wall of the contacting column

In accordance with the present disclosure there is also provided a feed distribution device for a contacting column comprising;

- a chamber located between a feed line inlet and a contacting column, said chamber having a cross-sectional area,
- a means for causing the flow from the feed line inlet to be in choked condition and to simultaneously at least partially vaporize before entering the interior portion of the section of the column, and
- a means for affixing the feed distribution device to an exterior portion of the contacting column;
- wherein the chamber at least partially surrounds a portion of the outer wall of the contacting column

BRIEF DESCRIPTION OF THE DRAWINGS

Fig 1 is a schematic of a distillation column.

Fig 2A is a top-down view of a section of a column with an open conical feed distribution device.

Fig 2B is a side-view representation of the section in Fig 2A.

~~Fig 3A is a top-down view of a section of a column with a partitioned conical feed distribution device.~~

~~Fig 3B is a side-view representation of the section in Fig 3B.~~

~~Fig 4 is a side-view representation of a section having a conical feed distribution device.~~

~~Fig 5 is a side-view representation of a lower section of a column having an open conical feed distribution device.~~

~~Fig 6A is a top-down view of a section of a column having an outer wall 50 and an embodiment of a feed distribution device having a tire shaped chamber 52 which encircles the outer wall of the column.~~

~~Fig 6B is a top-down view of a section of a column having an outer wall 50 and an embodiment of a feed distribution device having a tire shaped chamber 52 which encircles the outer wall of the column.~~

~~Fig 6C is a side-view representation of a cutaway A-A of the column and feed distribution device of Fig 6B.~~

~~DETAILED DESCRIPTION OF EXEMPARY EMBODIEMENTS~~

~~There are numerous types and variations of contacting device columns. Some of the standard contacting device columns are distillation columns, stripping columns and absorption columns. In addition to columns with a single purpose, some contacting columns are combinations of two or more standard processes (i.e. distillation and absorption). Further, there are categories such as packed columns and tray columns. One of ordinary skill in the art will recognize the applicability for the present invention in all of the types and variations of contacting devices enumerated above~~

Fig 3A is a top-down view of a section of a column with a partitioned conical feed distribution device.

Fig 3B is a side-view representation of the section in Fig 3B.

Fig 4 is a side-view representation of a section having a conical feed distribution device.

Fig 5 is a side-view representation of a lower section of a column having an open conical feed distribution device.

Fig 6A is a top-down view of a section of a column having an outer wall 50 and an embodiment of a feed distribution device having a tire shaped chamber 52 which encircles the outer wall of the column.

Fig 6B is a top-down view of a section of a column having an outer wall 50 and an embodiment of a feed distribution device having a tire shaped chamber 52 which encircles the outer wall of the column.

Fig 6C is a side-view representation of a cutaway A-A of the column and feed distribution device of Fig 6B.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

There are numerous types and variations of contacting device columns. Some of the standard contacting device columns are distillation columns, stripping columns and absorption columns. In addition to columns with a single purpose, some contacting columns are combinations of two or more standard processes (i.e. distillation and absorption). Further, there are categories such as packed columns and tray columns. One of ordinary skill in the art will recognize the applicability for the present invention in all of the types and variations of contacting devices enumerated above

in addition to those not specifically enumerated but art recognized, where such flashing feed conditions have at least the potential to exist.

Figure 1 shows a contacting device column 1 as a vacuum distillation column with one main feed inlet 2 and two outlets 3 and 4. One outlet is provided for each product to be separated from the feed by the separation sections, 5 provided above and 6 provided below the main feed inlet location. In addition to the main feed 2, there is a return feed inlet 7, reflux, located above the main feed inlet and a feed inlet 8, reboiler return, located in the lower section of the column. For simplicity, the system producing the vacuum has been omitted.

A feed inlet section is presented in more detail in Figures 2A and 2B. Figure 2A shows the sidewall of a contacting device column 10 which encloses the interior portion of the contacting device column. Affixed to the outside of column 10 is a feed distribution device 14. The feed distribution device is fed by feed 15 from line 12.

The feed distribution device is formed such that the feed stream flow at some point within the feed distribution device, and before entry in to the column, is in critical (choked) condition. As the pressure of the feed reduces, which is due for example in at least part to both flow friction and reduced height of the fluid column in line 12, the feed flow vaporizes significantly. Feed distribution device 14 has a cross-sectional area selected to allow the passage of the formed two phase mixture. The cross-sectional area is relatively small and therefore causes the flow to choke. This choking sets a maximum flow rate that can be achieved through the feed distribution device.

In practice, feed 15 flows through line 12 at a mass flow rate and at a first pressure during normal operation. The contacting column is kept at a second pressure which is lower than the first. When the feed exits the feed distribution device, based on the pressure differential the liquid portion of the feed will expand, vaporize and the feed will enter the column from each of any openings (a single opening is shown in Figures 2, 4 and 5 while multiple openings are shown in 3 and 6) and the feed flow at some point inside the feed distribution device 14 will be in critical (choked) conditions.

Based on the mass flow rate in the feed inlet, there is a point where the differential between the first pressure and the second pressure in the column no longer affects the amount of feed entering

CLAIMS

1. A contacting column section comprising a feed distribution device comprising;
   - a feed line inlet for introducing a feed which is at least partially liquid to the feed distribution device,
   - a chamber between the feed line inlet and the column, said chamber having a cross-sectional area, ~~and~~
   - a means for causing the flow to be in choked condition and to simultaneously at least partially vaporize before entering the interior portion of the section of the column; and
   - wherein the chamber at least partially surrounds a portion of the outer wall of the contacting column.

~~2. A feed distribution device for a contacting column comprising;~~
   - ~~a chamber located between a feed line inlet and a contacting column, said chamber having a cross-sectional area,~~
   - ~~a means for causing the flow from the feed line inlet to be in choked condition and to simultaneously at least partially vaporize before entering the interior portion of the section of the column, and~~
   - ~~a means for affixing the feed distribution device to an exterior portion of the contacting column.~~

~~3.~~2. A contacting column section according to ~~either~~ claim 1 ~~or 2~~, wherein said choking means is a partition within the chamber at a point between the feed line inlet and the interior portion of the section of the column, said partition having one or more openings, each of said openings having an opening area selected to cause the feed flow through the opening to be in choked condition and to simultaneously at least partially vaporize.

~~4.~~3. A contacting column section according to claim ~~3~~2, wherein the partition is a portion of the outer wall of the contacting column section.

~~5.~~4. A contacting column section according to claim 1 or 2, wherein said choking means is a device which causes increased pressure to the feed by the hydraulic head of liquid or by the hydraulic head of liquid and vapor mixture.

~~6.~~5. A contacting column section according to claim ~~5~~4, wherein the device is a pipe fitting ~~such as a bend, a T-junction with one branch sealed off or similar device~~ which causes the feed line inlet to be at a lower level than the end of the chamber attached to the column.

~~7.~~6. A contacting column section according to ~~any of the preceding claims~~claim 1, wherein the cross-sectional area of the chamber is greater than that of the feed inlet.

~~8. A contacting column section according to any of claims 1-6, wherein the chamber is at least partially surrounds a portion of the outer wall of the contacting column.~~

~~9.~~7. A contacting column section according to claim ~~8~~1, wherein the chamber completely surrounds the circumference of the contacting column section and wherein said choking means is a plurality of openings arranged between the chamber and the interior portion of the contacting column, each of said openings having an opening area selected to cause the feed flow through the opening to be in choked condition and to simultaneously at least partially vaporize

~~10.~~8. A contacting column section according to ~~any of the preceding claims~~ claim 1, wherein there is a separation section above, below or above and below the contacting column section and the separation section is for separation, distillation, heat transfer, extraction, wash operation or absorption.

~~11.~~9. A contacting column section according to ~~any of the preceding claims~~claim 1, wherein the feed distribution device is located outside of an interior of the contacting column section.

~~12.~~10. A contacting column section according to claim ~~11~~9, wherein the feed distribution device is affixed to an outer wall of the contacting column section which defines an interior portion of the contacting column section.

~~13.~~11. A contacting column section according to ~~any of the preceding claims~~claim 1, further comprising at least one additional feed distribution device.

~~14. A method of operating a contacting column section comprising the steps of,~~

~~feeding a feed, via a feed inlet, which is liquid or at least partially liquid to a feed distribution device affixed to an outer wall of the contacting column section, and~~

~~causing the feed to at least partially vaporize as it passes through a choking means of the feed distribution device in choked condition.~~

~~15. A method in accordance with claim 14, wherein the feed distribution device is in accordance with any of claims 1-13.~~

12. A feed distribution device for a contacting column comprising;

- a chamber located between a feed line inlet and a contacting column, said chamber having a cross-sectional area,
- a means for causing the flow from the feed line inlet to be in choked condition and to simultaneously at least partially vaporize before entering the interior portion of the section of the column, and
- a means for affixing the feed distribution device to an exterior portion of the contacting column;
- wherein the chamber at least partially surrounds a portion of the outer wall of the contacting column.

13. A contacting column section according to claim 12, wherein said choking means is a partition within the chamber at a point between the feed line inlet and the interior portion of the section of the column, said partition having one or more openings, each of said openings having an opening area selected to cause the feed flow through the opening to be in choked condition and to simultaneously at least partially vaporize.

14. A contacting column section according to claim 13, wherein the partition is a portion of the outer wall of the contacting column section.

15. A contacting column section according to claim 12, wherein said choking means is a device which causes increased pressure to the feed by the hydraulic head of liquid or by the hydraulic head of liquid and vapor mixture.

16. A contacting column section according to claim 15, wherein the device is a pipe fitting which causes the feed line inlet to be at a lower level than the end of the chamber attached to the column.

17. A contacting column section according to claim 1, wherein the chamber has an increasing cross-sectional area from the feed line inlet to the column.

18. A contacting column section according to claim 12, wherein the chamber has an increasing cross-sectional area from the feed line inlet to the column.