FIGURE 1

FIGURE 2

Sect. 2-2
SUMMARY OF THE INVENTION
It has now been found that by providing a baffle in the collection manifold in accordance with the present invention the coking in the downstream transfer line can be greatly reduced. This invention contemplates the use of a collection manifold for a steam cracking furnace having a baffle positioned to divide the streams of incoming gases from the various tubes of the steam cracking furnace into approximately equal parallel fractions and maintaining these fractions in separate chambers in the collection manifold. The fractions of gases are subsequently recombined at the outlet of the collection manifold as they pass into the transfer line for conveyance to downstream quenching facilities or other process equipment.

BRIEF DESCRIPTION OF THE DRAWINGS
The invention may be better understood by reference to the accompanying drawings of which:

FIG. 1 is a plan view of the collection manifold of this invention shown in cross-section with the baffle in place and;

FIG. 2 shows a view taken at cross section 2—2 of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS
Referring to the figures in detail, therein is shown a manifold body 10 having a number of inlet openings 12 to receive gaseous effluent from the tubes of a steam cracking furnace. A baffle plate 16 is held rigidly in place by a continuous weld 20 along the edge opposite the manifold inlet openings 12, and spacer rods 18 are attached at points along the baffle to hold it in rigid position within the manifold body. FIG. 1 also shows tubes 22 which connect the manifold inlet openings 12 to the outlet tubes from the steam cracking furnace (not shown). Transfer line 24 is shown in position at the outlet end of the manifold in position to convey gaseous effluent from the manifold to downstream quenching facilities or other process equipment (not shown).

FIG. 2 shows clearly the relationship of baffle 16 with manifold body 10, dividing the latter into approximately equal sized chambers. Spacer rods 18 are also shown holding the baffle 16 in a stable position to avoid undue wear, vibration, or damage to the baffle.

In the embodiment shown in the figures, the front edge of the baffle 16 is positioned just behind the inlet openings 12 and is aligned so as to divide the openings approximately in half across their horizontal plane. While the baffle should be approximately perpendicular to the inlet openings, variations of 10° either way from the perpendicular have been found acceptable. In general, best results are achieved in reducing coking of downstream equipment if the baffle is positioned to divide the incoming gases from the steam cracking furnace into approximately equal fractions. Preferably, neither fraction should contain more than about 60% of the total gas flow, nor less than about 40%.

The following comparative tests and example illustrate the effectiveness of this invention in reducing the extent of coking in the transfer line downstream from the collection manifold of a vertical steam cracking furnace.

A conventional gas oil feed is preheated and mixed with about 1/2 lb. steam per lb. of oil and passed through the coils of a conventional vertical steam cracking furnace. The coil outlet temperature of the gaseous product from the furnace is about 1600° F. The hot gaseous effluent passes from the various banks of tubes through connecting tubes into a steel collection manifold identical to that illustrated in FIG. 1, except that it contains no baffle. The gases pass through the manifold and into a transfer line
wherein they are quenched downstream by injection of a stream of cold quench oil in an amount sufficient to reduce the overall product temperature to about 500° F. The quenched product is then conveyed to a distillation tower for separation of the component into various desired products, including, e.g., ethylene, propylene, butadiene, and other olefins and diolefins.

Coking in the transfer line is soon evidenced by the pressure drop of the materials flowing through the line. The coke continues to build up until finally termination of the operation is required. The transfer line is then opened and examination shows extensive coking and plugging of the line both upstream and downstream from the quenching zone.

The collection manifold is then opened and fitted with a steel baffle, welded into position as illustrated in the figures, dividing the manifold body into essentially equal sized chambers. The manifold is then reinstalled, and steam cracking operations are again commenced in precisely the same manner as previously described. Coking again is evidenced by a gradual build up in pressure drop; however, the rate at which the coke is deposited is much slower than in the previous run made without a baffle in the collection manifold. In fact, the run is continued for a period 80% longer than was previously possible with the un baffled manifold.

Replicate runs are made, and the total operating time in each case is 50% to 100% longer when the collection manifold is adapted with a baffle compared to the base run made without a baffle.

It has been fairly conclusively established that the astonishing effectiveness of applicant's baffled manifold in lessening the extent of coking in the transfer line results from its virtual elimination of spiral flow of the effluent gases. For example, it is noted that when a baffle is not used, coke is laid down on the walls of the transfer line in a spiral pattern, whereas with the baffle in place, the coke laydown is generally uniform. Furthermore, mock-up tests in transparent scale models indicate, by visual examination, that the gases in the transfer line follow a spiral pattern without the baffle, whereas no spiral pattern is formed when the baffle is used.

It is not entirely certain how the baffled collection manifold of this invention prevents spiral flow; however, it is believed that by dividing the gas stream, dual spirals, which have opposite directions, are formed, and upon recombination, they eliminate each other. Surprisingly, a number of other mechanical devices have been found to be of little or no effect in preventing spiral flow. For example, orifice plates with single or multiple holes have been positioned at the manifold outlets and have been found completely ineffective in preventing spiral flow. Various configurations of straightening vanes have also been used with success.

Spiral flow is a particularly acute problem in the most preferred configurations of collection manifolds, i.e., those having nonuniform, progressively increasing crosssections. Problems are, however, also encountered in cylindrical manifolds of uniform cross-section, and it is contemplated that the unique baffle arrangement of applicants' invention can be used in any conventional manifold configurations.

The reason for the problems encountered in coking when the gaseous streams take on a spiral flow in the transfer line are not entirely clear. However, it is believed that the spiral flow causes heavier components, especially from quench oil, which are more susceptible to coking, to be thrown centrifugally to the walls of the transfer line to form slower moving, or stagnant, zones which are highly susceptible to additional reaction, polymerization, or cracking. Whatever the cause, it is clear that coking is definitely more severe when the effluent gases from the collection manifold take on a spiral flow pattern in the transfer line to the downstream process equipment.

What is claimed is:

1. A method for lessening coking of effluent gases in the transfer line downstream from a collection manifold of a steam cracking furnace which comprises collecting the effluent gases from said furnace at a temperature ranging from about 1300° F. to about 1800° F., dividing the flow of said gases in said manifold into approximately equal parallel fractions and recombining said fractions prior to quenching of the gaseous effluent, whereby spiral flow of the recombined fractions of gases is avoided.

2. Apparatus for the collection and distribution of gaseous effluent from steam cracking furnaces to downstream processing equipment which lessens coking of said effluent and which comprises:
   a. a manifold body having a plurality of inlets for the entry of said effluent and at least one outlet for the passage of said effluent downstream;
   b. a baffle dividing said manifold body into approximately equal sized chambers, said baffle positioned substantially perpendicular to said inlets whereby said inlets and outlet are in direct and open communication with both of said chambers simultaneously;
   c. conduit means for effluent flow from said steam cracking furnace to said inlets; and
   d. transfer line means for connecting said outlet to said downstream process equipment whereby a fraction of said gaseous effluent from the steam cracking furnace enters each of said chambers through said inlets and then leaves said chambers through said outlet and passes to said downstream process equipment.

3. The apparatus of claim 2 wherein said baffle is a metallic baffle attached to said manifold body by means of a continuous weld along the edge of the baffle opposite said inlets.

4. The apparatus of claim 3 including spacer rods for maintaining said baffle in rigid alignment with said inlets and outlet.

5. The apparatus of claim 2 wherein said manifold continuously increases in cross-sectional area in the downstream direction.

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