

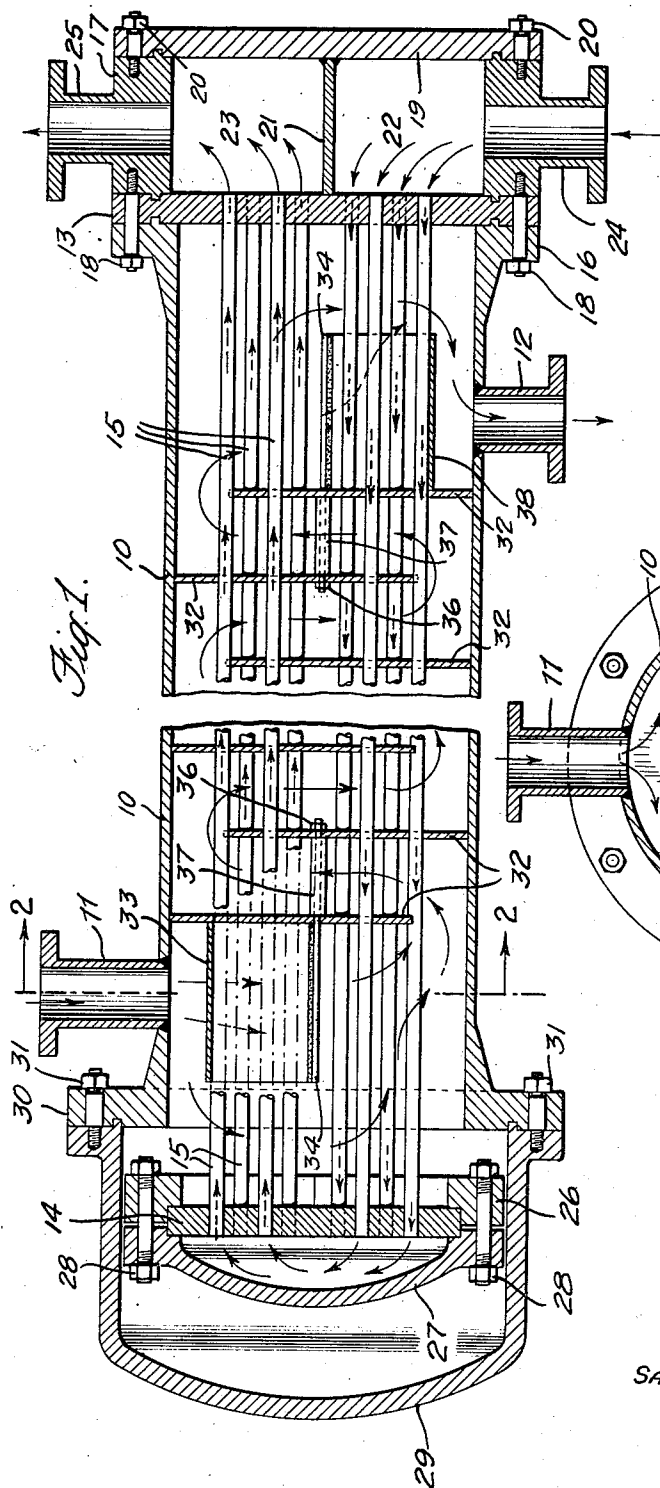
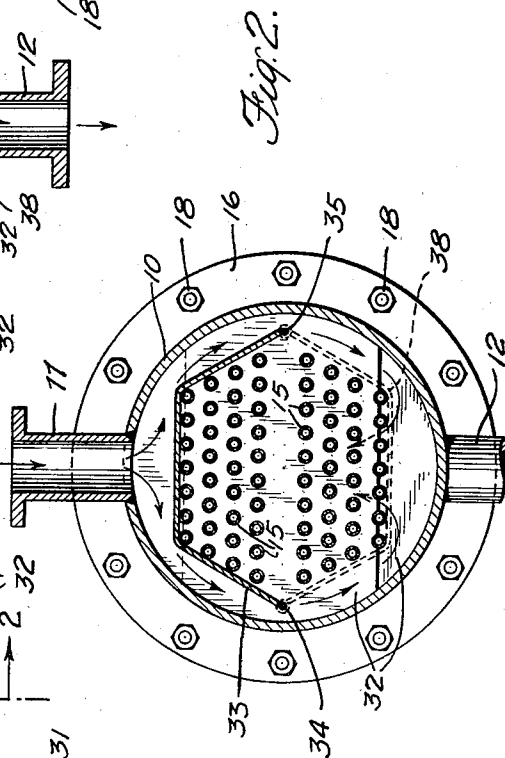
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HEAT EXCHANGER

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HEAT EXCHANGER

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2 Claims. (Cl. 257—236)

This invention relates to heat exchangers of the shell and tube type such as are employed in the heating and cooling of liquids, vapors and gases. More particularly, the invention pertains to improvements in baffles used in such heat exchangers.

The particular features and advantages of the invention will be understood from the following description considered in connection with the accompanying drawing forming a part thereof, and in which:

Fig. 1 is a longitudinal sectional view of a heat exchanger embodying the invention, and

Fig. 2 is a transverse sectional view taken on line 2—2 of Fig. 1.

Referring to the drawing, the heat exchanger illustrated includes a flanged cylindrical shell 10 having an inlet nozzle 11 and an outlet nozzle 12. Within the shell and extending between a fixed tube sheet 13 at one end, and a floating tube sheet 14 at the other end, are tubes 15. The fixed tube sheet is clamped between shell flange 16 and a stationary channel member 17 by stud bolts 18. The channel member is closed at its outer end by cover plate 19 secured in position by stud bolts 20. A partition 21 divides the channel member 17 into compartments 22 and 23 which communicate respectively with an inlet nozzle 24 and an outlet nozzle 25. At the opposite end of the shell, the floating tube sheet 14 is clamped between a split ring 26 and return header cover plate 27 by bolts 28. The shell at this end is closed by shell cover 29 which is secured to shell flange 30 by stud bolts 31.

One of the heat exchange mediums will flow through the tubes 15 in two passes from the stationary channel inlet to the outlet thereof, while another liquid, vapor or gas, will flow through the intertube space in the shell from the inlet 11 to the outlet 12. The "floating head" to which the tubes are connected at one end will provide for the relative expansion and contraction of the tubes and the shell. Since the clamping ring 26 is split, or comprises a plurality of separate parts, it is readily demountable and may be removed, together with the cover 27 from the floating tube sheet to permit the latter to be withdrawn through the shell with the tube bundle from the stationary tube sheet end for the purpose of inspection or cleaning.

A plurality of spaced transverse baffles 32 through which the tubes pass, and which are free to move with respect to the inner surface of the shell serve to direct flow through the intertube space in the shell in a zig-zag path, and

to prevent by-passing of any portion of the tube surface. Disposed opposite the shell inlet nozzle 11 and in contact with one of the transverse baffles 32 is an inverted U-shaped removable wrapper plate baffle 33. As shown in the drawing, this baffle extends longitudinally of the tubes in the space between the outermost tubes of the second tube pass and the shell, and comprises an upper horizontal portion and vertically inclined portions which extend downwardly and outwardly adjacent the outermost tubes of rows forming the second pass. The arrangement is such that in operation, that portion of the tube bundle which is opposite the shell inlet 11 is shielded from direct impingement of the entering liquid, vapor or gas, a substantial portion of which is caused to flow substantially longitudinally of the shell towards the floating tube sheet end before coming in contact with the tubes. The wrapper baffle is supported and secured in position by relatively short tie rods 34 and 35 to which the lower edges of the vertically inclined portions of the baffle are welded. The tie rods are supported by the transverse baffle 32 which engages the inner end of the wrapper baffle and the adjacent transverse baffle 32 through both of which the tie rods extend. The inner ends of the rods are threaded and receive nuts 36 by means of which the assembly is secured together. The rods 34 and 35 pass through tubular spacers 37 between the two transverse supporting baffles, which prevent displacement or distortion of the baffles when the nuts 36 are tightened.

A wrapper baffle 38 is disposed adjacent the shell outlet nozzle 12. Baffle 38 is similar to the wrapper baffle 33, excepting that it is disposed in an inverted position. However, it functions mainly as a distributing baffle rather than as an impingement preventing device. As indicated by the flow arrows, a substantial portion of liquid, vapor or gas flowing through the shell must pass around the outer end of the baffle 38 in contact with the tube surface adjacent the fixed tube sheet before entering the outlet nozzle.

When the tube bundle is removed from the shell for the purpose of inspection or cleaning, the wrapper baffles are removed from the tubes by releasing the nuts 36, and then moving the baffles together with the tie rods to which they are attached, longitudinally of the tubes and towards the adjacent tube sheets until the tie rods are free of the transverse supporting baffles. The baffles may then be lifted clear of the tube bundle. The distance between the outer end of each

wrapper baffle and the adjacent tube sheet should be great enough to permit the baffle to be moved longitudinally after the nuts 36 have been removed to free the tie rods 34 and 35 from the transverse baffles through which they pass. In prior constructions when wrapper type baffles were employed in apparatus of the kind described, it has been customary to support the baffles by tie rods which extended for the full length of the tube bundle between the tube sheets. Obviously with such an arrangement it was impossible to remove the baffles readily without first severing their connection to the tie rods, which was a costly and awkward procedure.

It will be understood that changes may be made in the form, location and relative arrangement of the several parts of the apparatus disclosed without departing from the principles of the invention which is not to be limited excepting by the scope of the appended claims.

What is claimed is:

1. Heat exchange apparatus comprising a shell having an opening through which fluid enters the shell and an opening through which fluid leaves the shell, tubes in the shell, spaced baffles disposed transversely of the tubes for directing the flow of fluid through the shell from one

of said openings to the other, a wrapper baffle in the shell between the tubes and the shell in the region of at least one of said openings, rods secured to the wrapper baffle, said rods extending through and terminating adjacent the far side of a group of transverse baffles adjacent said one opening, and means for removably securing the rods to said group of transverse baffles.

2. Heat exchange apparatus comprising a shell having an opening through which fluid enters the shell and an opening through which fluid leaves the shell, tubes in the shell, spaced baffles disposed transversely of the tubes for directing the flow of fluid through the shell from one of said openings to the other, a wrapper baffle in the shell between the tubes and the shell in the region of at least one of said openings and substantially in engagement with one of said transverse baffles, rods secured to the end portions of said wrapper baffle, said rods extending through said one transverse baffle and the baffle adjacent thereto and terminating adjacent the far side of said last mentioned baffle, and means for removably securing the rods to said baffles.

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