WESTINGHOUSE FEEDWATER HEATERS I.B. 6193
HIGH PRESSURE FEED WATER HEATER

Description

Figure 1 shows a horizontal, high pressure, tubular type of feedwater heater with removable tube bundle. Boiler pressure of 1200#/sq.in. is not unusual and with heaters installed in the feed line between the pump and boilers, the tubes, tube sheets, channels and covers must be capable of withstanding high pressures. It is evident that the standard type of flanges and bolting would be rather cumbersome for such duty and in view of this, the design shown, particularly the water path, is used for pressures of 600#/sq.in and above.

The flow of water through the tubes is usually arranged multi-pass, four pass being the arrangement shown in Figure 1.

The inlet channel and tube sheet are usually made in one piece. The flange may be welded as shown or made an integral part of the steel forging. The forged steel water inlet and outlet nozzles are welded to the inlet channel. To prevent leakage between compartments, an inner cover "5" is bolted to the partitions. This cover and bolting are designed to withstand only the differential pressure between the water passes; as the full pressure is transmitted to cover "3" through the equalizing hole shown in the inner cover. The total pressure load on cover "3" is taken by packing ring "8" which is backed up by a single piece ring "7", and this in turn is supported on the three piece key ring "6" as indicated. Ring "9" is bolted to cover "3" and the purpose of this ring is to maintain the position of the three piece key ring. The bolting shown in the outer ring is used only for the purpose of establishing sufficient pressure on the packing to seal at the initial low water pressure in the channel. As the water pressure increases, the pressure on the packing increases and, with the initial seal established by means of the external bolting, adequate sealing pressure is maintained regardless of the pressure in the channel. The seal is made by the packing along the inside wall of the channel and along the contact surface on cover "3".

The packing ring consists of closely braided asbestos with each strand wound on a monel metal wire. To allow for compression, the ring should be cut 1/2" in excess of the actual measurement. The ends should be neatly trimmed and the packing should be inserted by hand and evenly adjusted.

One of the segments of the three piece key ring is made with the two sides parallel to permit removal, as well as installation. Jack Screw bolts in the channel, as indicated at the inlet end, or else grooves in the ring, as shown on the floating end, are provided to facilitate removal of the ring. Bolt ring "2" and the bolts may be used for removing cover "3" and the seal ring and packing. Obviously, before this is done rings "6" and "9" must be removed.

The above description of the inlet channel, covers, etc., also applies to the corresponding parts on the floating end. Obviously, there are no water nozzles on the floating end and with only two water passes, the inner cover is omitted at this end.

Tubes are expanded at both ends and the tube holes are grooved as indicated. As previously mentioned, the tube bundle is of the removable type. The tubes, however, may be inspected, cleaned, expanded or replaced by removing the shell cover and the channel covers, etc., described above.

The transverse baffles are welded to rods "12". To protect the tubes from erosion, an impingement baffle "13" is provided at the steam inlet.

List of Parts.

The following list, covering major parts, has been compiled to facilitate ordering repair parts by item number and name when the serial number of the heater is given:

Inlet Channel Parts

1. Channel and Tube Sheet
2. Bolting Ring
3. Main Cover
4. Inner Cover Gasket
5. Inner Cover
6. Three Piece Key Ring
7. Seating Ring
8. Packing
9. Retainer Ring

Floating Channel Parts

15. Channel and Tube Sheet
16. Bolting Ring
17. Main Cover
18. Inner Cover Gasket
19. Inner Cover
20. Three Piece Key Ring
21. Seating Ring
22. Packing
23. Retainer Ring

Shell and Tube Parts

10. Shell
11. Transverse Baffles
12. Transverse Baffle Rods
13. Impingement Baffle
14. Tubes
24. Shell Cover
25. Shell Gaskets

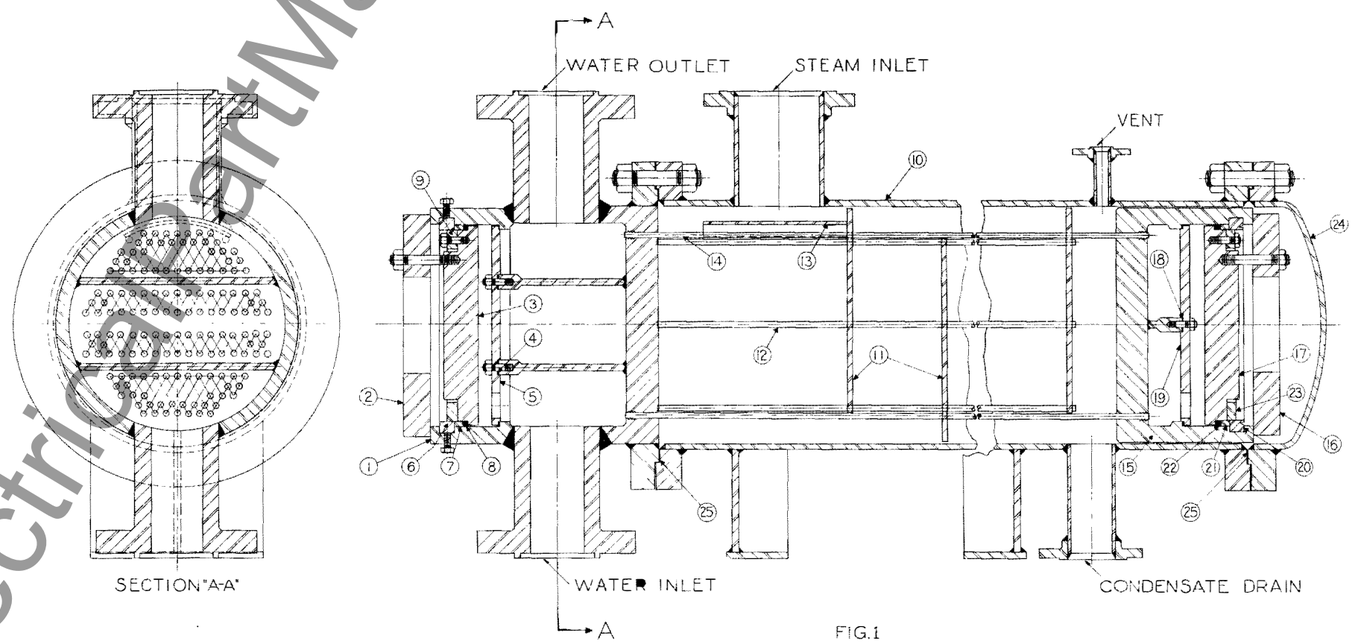

FIG.1

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