

SURFACE CONDENSERS

Description

Figure 1 shows a sectional assembly of this unit. The condenser is of the radial flow, divided water box, single pass type with the steam inlet located in the conventional position at the top. The obvious purpose of the divided water box design is to enable tubes to be cleaned in one half of the condenser while the other half remains in service. As implied from the name, each water box is divided into two compartments by a vertical partition and separate covers are provided for each half. There are two water inlet and two water outlet openings and the external piping must be arranged to permit shutting off the water from either one of the inlet connections. A sluice gate valve is installed in the vertical partition inside the inlet water box. With this valve open water can be supplied to the whole condenser with water flowing through only one of the two inlet openings.

The two storage tanks at the bottom are in reality enlarged hotwells. These hotwells are of the deaerating type and each is equipped with a water seal. Vent pipes "44" connect the top of the hotwells to a zone of lower pressure within the condenser. In this type of condenser design, the condensate temperature approaches that of the exhaust steam and by venting the hotwells some of the condensate in the wells will flash and thus aid the liberation of the air from the condensate. It is this feature that enables a condenser of the radial flow design to deliver condensate having a minimum oxygen content.

Supports independent of the condenser ones are provided for these storage hotwell tanks. Strainer plates "32" are installed at each of the two condensate outlet openings.

For withdrawing the uncondensed gases two outlets are provided, one serving the L.H. side and the other one the R.H. side of the condenser. The upper and lower baffles "35" extend throughout the entire tube length and the tubes adjacent to the center core comprise the air cooler section of the condenser.

Steam is admitted to substantially the entire periphery of the tube bank, flowing radially towards the core space at the center. To provide for the two outlet arrangements mentioned above, the internal air offtake pipe is divided into two separate compartments as indicated in Figure 1. Since the internal arrangement provides for withdrawing the uncondensed gases from the water inlet end, the flow in the center core is towards that end. This flow in the core is uninterrupted from the water outlet end up to the first one of the three transverse baffles "36". The shape of these baffles is shown in Figure 1 and the purpose of these is to divert the flow over the tubes, thereby insuring the condensation of all the steam and cooling of the uncondensed gases before the air offtake pipes are reached. It is to be noted that the gases before being removed from the condenser are cooled by the coldest water, for as already stated these gases are withdrawn at the water inlet end. Vertical baffles are provided to prevent short circuiting of the steam from the half of the condenser not in service into the internal air pipe of the half in service.

The mechanical details of the structure are shown in Figure 1. The tubes are rolled into the tube sheets at both ends and to provide for a difference of expansion between the tubes and the shell a flexible diaphragm is provided at each end of the shell. These diaphragms also serve as flanges between the shell and the tube sheets.

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Tube support stays and shell bracing are provided as indicated in Figure 1. An anti-sway trunion "25" is provided at the bottom of the shell.

Spring supports of the conventional type with hydraulic jacks are provided under each supporting foot. Distance pieces "18" should be in place only when the shell is full of water.

Water box covers are equipped with manholes and covers to provide easy access to the water boxes. Manholes with covers are also provided on one of the water inlet tube sheet halves, on the vertical baffle, on the transverse baffles and on condensate tanks.

List of Parts

The following list covers the major parts of the condenser:

Item No.	NAME
1	Water Box (Inlet)
2	Water Box Cover (INLET)
3	Manhole Covers
4	Valve Gate
5	Valve Stem
6	Water Box (Outlet)
7	Water Box Cover (Outlet)
8	Shell
9	Tube Sheet (Inlet)
10	Tube Sheet Supports
11	Tube Sheet (Outlet)
12	Tubes
13	Shell Stays
14	Shell Stays
15	Shell Reinforcing Beams
16	Tube Supports
17	Tube Support Lugs
18	Distance Pieces (Spring Supports)
19	Support Brackets
20	Bedplates (Spring Supports)
21	Support Brackets
22	Hydraulic Jacks (Spring Supports)
23	Base Plates (Spring Supports)
24	Springs
25	Anti-Sway Trunion
26	Storage Tank (R.H.)
27	Condensate Distributing Troughs
28	Condensate Outlet Pipes
29	Expansion Joint
30	Condensate Outlet Pipe
31	Storage Tank (L.H.)
32	Strainer Plates
33	Air Outlet Pipes
34	Air Box
35	Baffles (Horizontal)
36	Baffles (Transverse)
37	Manhole Covers (Transverse Baffles)
38	Baffle Stays
39	Manhole Cover (Tube Sheet)
40	Deflector Plate (Heater Drain)
41	Deflector Plate (Future steam connection)
42	Make-up Water Pipe
43	Exhaust Steam Connection (Future)
44	Vent Pipes
45	Diaphragms
46	Tube Support Stays
47	Manhole Cover (Vertical Baffle)

