

AIR EJECTOR UNIT

Description

The ejectors are of the two stage condensing type and the assembly consists of two first stages and two second stages. These are mounted on surface type inter and after condensers.

The gases entering the first stages of the ejectors are entrained by the jets of steam from the first stage nozzles. This gas and steam mixture is then discharged through diffusers "7" into the inter condenser in which the steam is condensed and the uncondensed gases are cooled to reduce their volume. In the diffusers the velocity energy is converted into pressure. From the inter condenser, the gases enter the second stages of the ejectors and are entrained by the second jets of steam and the mixture is then discharged through the diffusers "14" into the after condenser. In the after condenser, the steam is condensed and the uncondensed gases are allowed to escape to the atmosphere through the vent opening.

The baffles in the inter and after condenser provide for the flow of the steam and uncondensed gases over the tubes and thus insure the condensing of the former and proper cooling of the latter. For the protection of the tubes impingement baffles, "22" and "31" are provided at the discharges of the first and second stages.

Condensate from the inter and after condensers is drained back into the main condenser, thus providing an opportunity for the liberation of the entrained air from the water. A loop with water seal not less than 7 ft. high is provided for the inter condenser drain line. This seal is necessary to counteract the pressure difference between the inter condenser and the main condenser. The after condenser, in which practically atmospheric pressure prevails, is drained by means of a special drain trap.

The steam nozzle arrangement is shown in the enlarged section of Figure 1. Copper gaskets are provided under nozzles and nozzle rings to insure steam tight joints. The setting of the nozzles should not be changed under any circumstances.

Gate valves are installed at the discharges of the first stages and at the inlets to the second stages. These with the gate valves at the ejector suctions permit the isolation of any one of the ejector elements.

The inter and after condensers are arranged for parallel single pass flow of water, the main unit condensate being used as the cooling medium. The tubes are expanded into the tube sheets at both ends. Removable covers are provided on the water boxes of the inter and after condensers.

Operation and Maintenance

The actual operation of air ejectors requires very little attention however, the design steam pressure and temperature must be maintained at all times at the nozzle inlets. Trouble often results from either low steam pressure, wet steam, or from an obstructed nozzle or steam strainer. Such conditions may be detected generally by unstable operation or failure to obtain or maintain the desired condenser vacuum. Obviously, such conditions when found must be corrected.

It is important that the copper gasketed joints between the steam nozzles, nozzle rings, and the air chambers be absolutely steam tight because any steam leakage at these points will reduce the effective capacity of the

Air Ejector Unit

ejectors. This should be kept in mind, in case a nozzle is temporarily removed for inspection or for cleaning.

Procedure for starting one or both two stage ejectors is as follows:

1. Vent from the after condenser to the atmosphere must be free.
2. Condensate drain from the after condenser and also the one from the inter condenser must be free.
3. Open valve to allow cooling water to be circulated through the inter and after condensers.
4. With steam in the steam header the steam inlet valves on the second stages should be opened. (Ejector elements are designated first stages, second stages, etc., according to the sequence of the flow of the gases which are being removed).
5. Open gate valves "16" between the second stages and the inter condenser.
6. Open gate valves "8" between the inter condenser and the discharges of the first stages.
7. Open gate valves between the first stages and the main condenser.
8. After the maximum vacuum that can be obtained with the second stages is reached, open the steam inlet valves to the first stages.

The sequence of operations for starting the ejectors is important and it should be performed in the reverse order when shutting down the unit. Always OPEN THE GATE VALVES at the discharges of the first stages BEFORE OPENING THE STEAM INLET VALVES to these stages and DO NOT CLOSE THESE GATE VALVES UNTIL STEAM INLET VALVES ARE CLOSED. Failure to observe the foregoing instructions will subject the diffusers and other ejector parts to a steam pressure far in excess of the design pressure of these parts.

In order to obtain the rated capacity of the ejectors, the amount of cooling water circulated must not be below the figure for which the unit is designed. Likewise the temperature of this water must not exceed the figure on which the design is based.

List of Parts

The following list, covering major parts, has been compiled to facilitate ordering repair parts by item number and name when the serials of the ejectors or of the inter and after condensers are given.

FIRST STAGES		SECOND STAGES	
Item No.	Name	Item No.	Name
1	Air Chambers	9	Air Chambers
2	Air Chamber Covers	10	Air Chamber Covers
3	Nozzles	11	Nozzles
4	Nozzle Nuts	12	Nozzle Nuts
5	Nozzle Rings	13	Nozzle Gaskets
6	Nozzle or Ring Gaskets	14	Diffusers
7	Diffusers	15	Elbows
8	Gate Valves	16	Gate Valves
INTER CONDENSER		AFTER CONDENSER	
17	Outlet Water Box	26	Inlet Water Box
18	Outlet Water Box Cover	27	Inlet Water Box Cover
19	Inlet Water Box	28	Outlet Water Box
20	Inlet Water Box Cover	29	Outlet Water Box Cover
21	Shell	30	Shell
22	Baffles (Impingement)	31	Baffles (Impingement)
23	Baffles	32	Tube Sheets
24	Baffles	33	Tubes (Inter and After Condensers)
25	Tube Sheets	34	Baffle (Transverse)

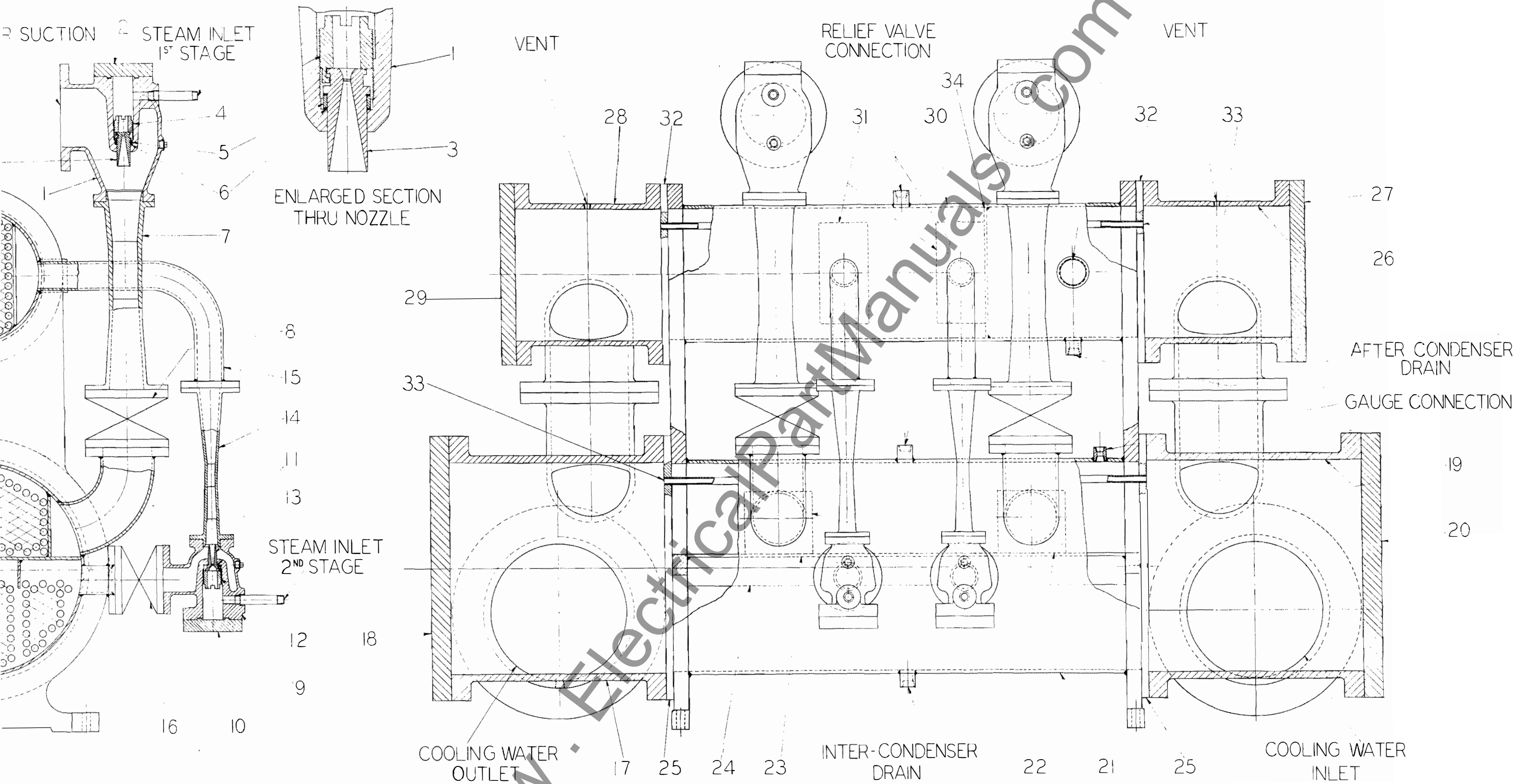


Figure 1