Steam Chest

A typical arrangement of the multiple-valve steam chest is shown in Figure 1. The main body and nozzle chambers are cast integrally with the cylinder cover, thus eliminating joints between these parts. The valves are arranged in parallel within the chest; that is, all valves are surrounded with steam at approximately throttle pressure.

These valves are of the single seated, plug type. The seats are pressed into the steam chest body and can be replaced if necessary. The governor servo-motor raises and lowers the valve bar "24", keeping it perfectly horizontal at all times. The bar, in turn, lifts the valves by engaging the adjusting nuts "23". As shown in the illustration, the adjusting nuts are threaded on the valves and hence the point at which each valve opens and the amount of opening can be varied by means of these adjusting nuts. Of course, there is an unbalanced steam force tending to close the valves, but in addition, a positive closing force is obtained by the lower edge of the bar "24" engaging the lower shoulder on each valve.

The valve bar stem packing consists of two closely fitting bushings "18" and "20" with suitable leak-off openings. On valves built for pressures above 450 lbs., two leakoffs are provided as shown in the Figure, while valves built for 450 pounds pressure or lower have only one leak-off, the other being omitted or plugged. When two leak-offs are used the upper one is led to a point at atmospheric pressure where a small amount of escaping steam is not objectionable. The lower one is led to a zone of intermediate pressure in the turbine. When only one leak-off is used, it is led to a point at atmospheric pressure at all times.

The two operating levers "10", each of which is connected to a valve bar stem crosshead at one end and to the governor linkage at the other end, are fulcrumed on the shafts "43" which are carried in the fulcrum links "9". These links are in turn fulcrumed on the shafts "6". This construction gives ample flexibility to allow the crossheads "15", which are guided in the sleeve "19", to maintain correct alignment of the valve bar stems throughout the entire stroke of the mechanism.

With the operating levers fulcrumed as shown, it is obvious that downward movement of the governor servo-motor piston opens the valves and upward movement of the piston closes them.

An additional positive closing force is exerted by the balance pistons 3, which are attached to the valve bar stems by the connecting rods 4 and pins "2" and "5". The top of each piston "3" is subjected to full steam pressure while the chambers at the bottom are connected to atmosphere through the leak-offs as shown. Therefore, the unbalanced forces on these pistons, exert at all times, a downward force tending to close the valves in case they have any tendency to stick.

As stated above, the illustration shows a typical arrangement in which the first valve is in the center, and the sixth and seventh on the ends. However, the number of valves and the position of each in the chest may vary to suit different steam and load conditions. For each particular turbine, there is a "Steam Chest Valve Setting Diagram" which shows the correct valve locations and the dimensions for setting the valve adjusting nuts "23" to obtain the proper sequence of opening. A print of this diagram will be found in the instruction book for each unit.

The valve lifts as given on this diagram should give satisfactory operation. However, in some cases it may be desirable to adjust the nuts "23" to bring certain valves in earlier or later in order to obtain the correct pressure drop across each. This pressure drop is usually about 4 percent, but may be 2 or 3 percent on some non condensing machines.

The following list has been compiled to facilitate ordering spare or renewal parts by item number and name together with the serial number of the turbine:

Item No.	Name
1	Valve Bar Balance Piston Bushing
2	Valve Bar Stem Connecting Rod Pin (Lower)
3	Valve Bar Balance Piston
4	Valve Bar Stem Connecting Rod
5	Valve Bar Stem Connecting Rod Pin (Upper)
6	Fulcrum Link Shaft
7	Fulcrum Link Shaft Bearing
8	Fulcrum Link Shaft Bearing Cap
9	Fulcrum Link
10	Operating Lever
11	Governor Connecting Link
12	Governor Connecting Link Pin
13	Valve Bar Stem Crosshead Pin
14	Valve Bar Stem Crosshead Pin Bushing
15	Valve Bar Stem Crosshead
16	Valve Bar Stem Coupling Nut
17	Valve Bar Stem
18	Valve Bar Stem Bushing (Upper)
19	Valve Bar Stem Bushing Sleeve
20	Valve Bar Stem Bushing (Lower)
21	Steam Chest Cover
22	Valve Adjusting Nut Lock Nut
23	Valve Adjusting Nut
24	Valve Bar
25	Valve Seat
26	Valve
27	Valve Seat
28	Valve
29	Valve Seat
30	Valve
31	Valve Seat
32	Valve
33	Valve Seat
34	Valve
35	Valve Seat
36	Valve
37	Valve Seat
38	Valve
39	Valve Bar Stem Strut Seat (Lower)
40	Valve Bar Stem Strut
41	Valve Bar Stem Strut Seat (Upper)
42	Operating Lever Fulcrum Shaft Bearing
43	Operating Lever Fulcrum Shaft
44	Governor Connecting Link Pin
45	Governor Connecting Link Pin Bushing
46	Governor Connecting Link Bushing
47	Grease Cup

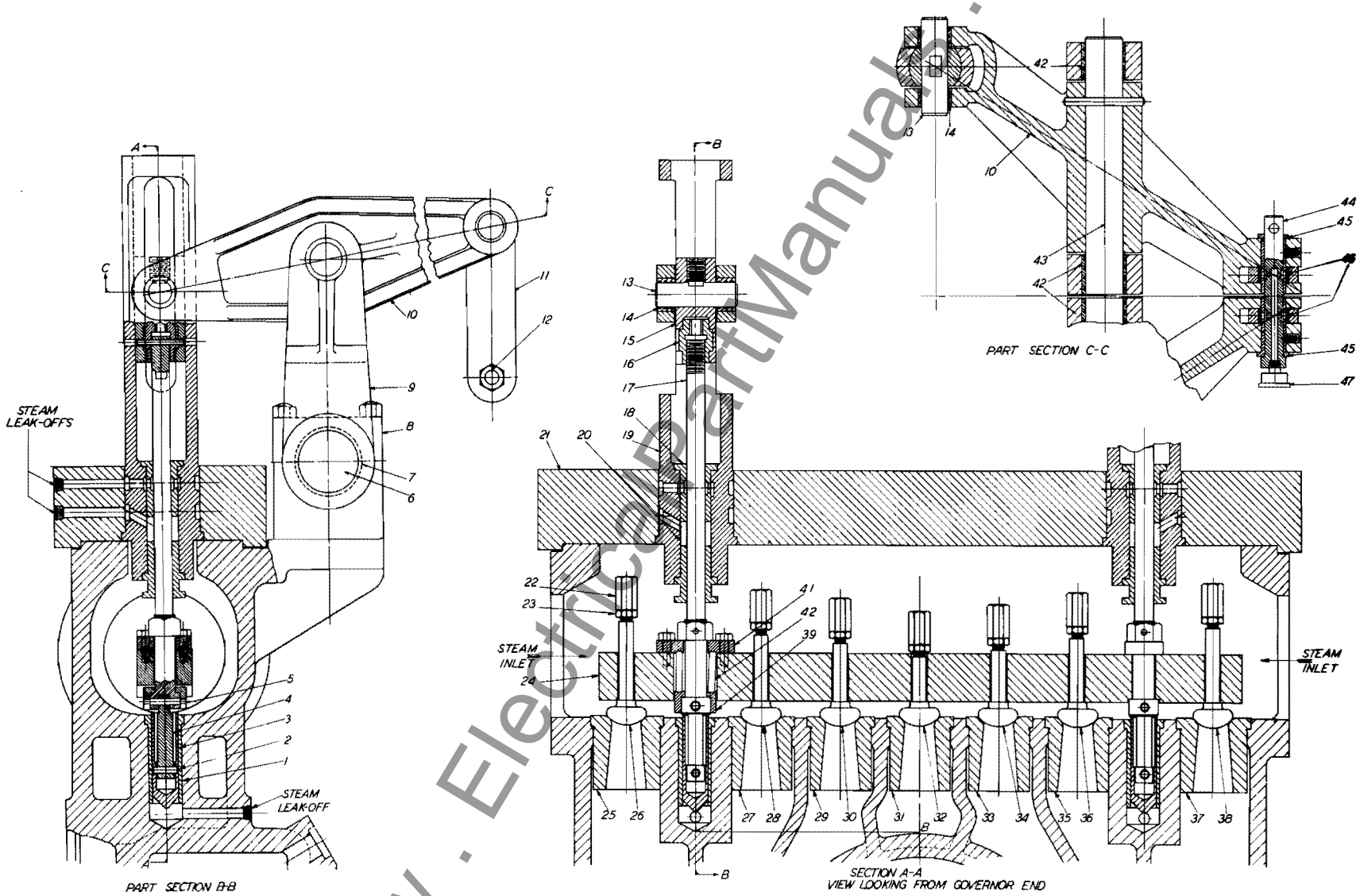

Fig. 1 - Steam Chest