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 casing 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 body and can be replaced, if necessary. The operating mechanism raises and lowers the valve bar "18", keeping it perfectly horizontal at all times. The bar, in turn, lifts the valves by engaging the adjusting nuts "17". 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 "18" engaging the lower shoulder on each valve.

The valve bar stem packing consists of two closely fitting bushings "11" and "13" with suitable leak-off openings. On valves built for 650 pounds pressure or higher, two leak-offs are provided as shown in the Figure; while valves built for 450 pounds pressure or lower have only the lower leak-off, the upper one 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 piped to a zone of intermediate pressure in the turbine. When only the lower leak-off is used, it is led to a point at atmospheric pressure at all times.

The operating lever is in reality a "V" shaped rock shaft, with the central arm connected to the governor and each of the two branch arms connected to a valve bar stem. Universal joints are used in the connecting links to insure correct alignment of the moving parts. The operating lever (or rock shaft) is fulcrumed on the shaft "9" so that downward movement of the governor 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 to open 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 "17" to obtain the proper sequence of opening. A print of this diagram will be found in the instruction book for each particular 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 "17" to bring certain valves in earlier or later, in order to obtain the correct pressure drop across each. This pressure drop is usually about 2 percent for non-condensing machines and 4 percent for condensing machines.

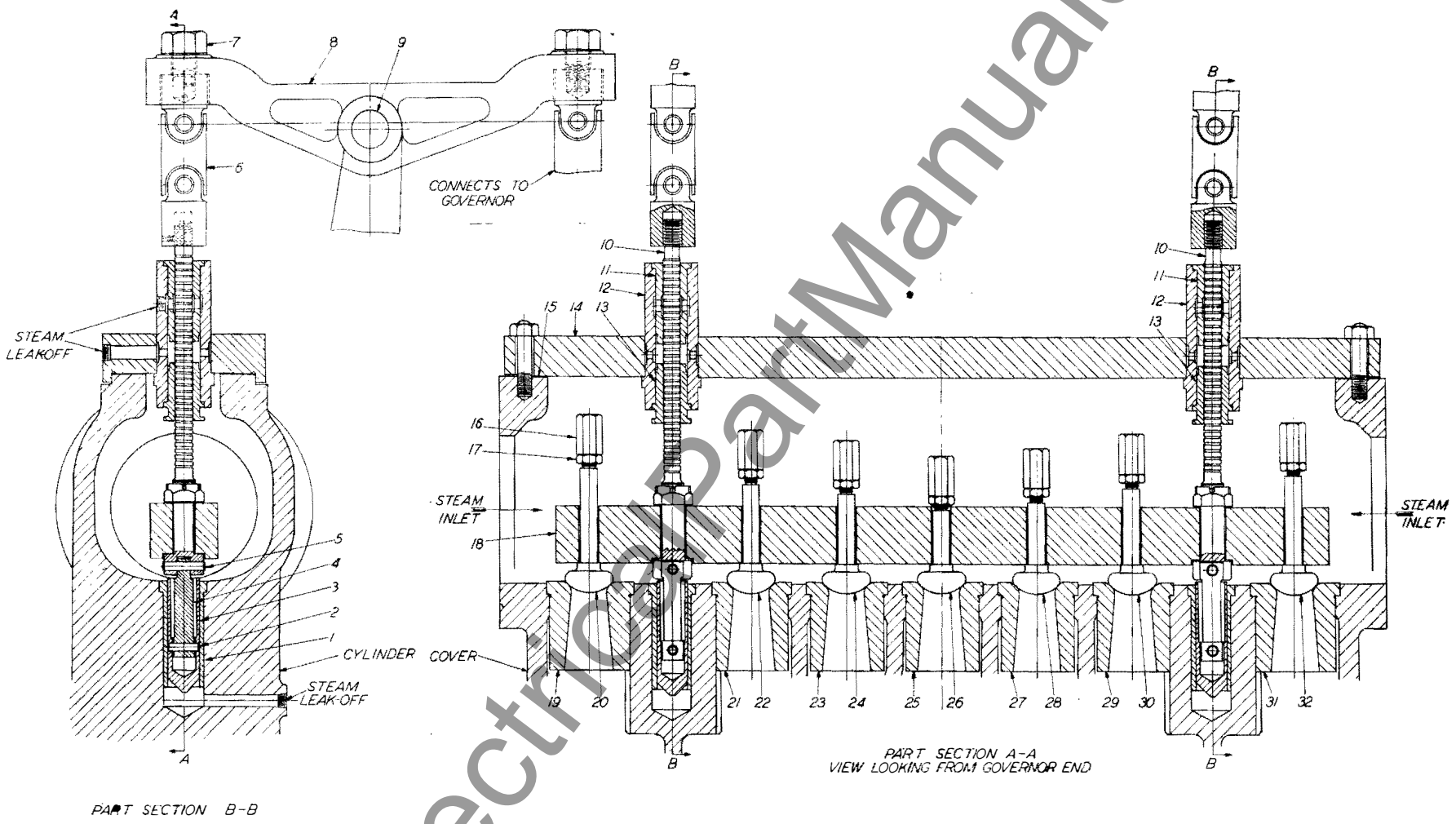

Fig. 1 - Steam Chest Valve Assembly

The following list has been compiled to facilitate ordering spare or renewal parts by name and number, 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	Universal Joint (Complete)
7	Tap Bolt
8	Lever
9	Lever Shaft
10	Valve Bar Stem
11	Valve Bar Stem Bushing (Upper)
12	Valve Bar Stem Bushing Retainer
13	Valve Bar Stem Bushing (Lower)
14	Steam Chest Cover
15	Gasket
16	Valve Adjusting Nut Lock Nut
17	Valve Adjusting Nut
18	Valve Bar
19	Valve Seat
20	Valve
21	Valve Seat
22	Valve
23	Valve Seat
24	Valve
25	Valve Seat
26	Valve
27	Valve Seat
28	Valve
29	Valve Seat
30	Valve
31	Valve Seat
32	Valve

Printed in U.S.A. (Rev. 11-38)