GOVERNOR VALVE SERVOMOTOR

The governor is not directly connected to the steam chest valve but actuates a servo-motor which supplies the necessary power for positive movement of the steam valve.

The servo-motor, illustrated in Fig. 1, consists of a relay and an operating piston mounted in a cylinder which may be located either directly over, or alongside the steam chest, as the characteristics of the particular application may require. For simplicity and compactness the assembly is arranged with the relay inside the operating piston so that no levers or linkage are required.

Referring to the illustration, the steam chest valve stem (or valve operating stem, depending on the relative location of the servo-motor and steam chest) "20" is connected to the operating piston "12" by means of the threaded collar "2" which is held in the coupling head "4" by the bushing "1". The coupling head "4" in turn is screwed into the end of the operating piston "12".

The piston "12" slides within the cylinder "5" and is subjected to pressure in the closing direction by the spring "19". It is sealed against the cylinder wall by the piston ring "11". The inner bore of the piston is similarly sealed against a projection of the cylinder cover "14" by the ring "16".

The relay "10" slides within a bore in the operating piston "12" and is subjected on its upper surface to the governing oil pressure, which is resisted by the tension of the relay spring "8". The relay and the bore of the operating piston are ported so that motion of the relay relatively to the piston admits operating oil pressure under the piston or releases it to drain, thus producing an opening or a closing motion of the steam valve, as the case may be.

An operating cycle would take place as follows: If the speed increases the governing oil pressure will be increased. This pressure increase, being transmitted to the top of the relay through the passage from the governor oil inlet, will cause the relay to move downward against the resistance of spring "8" an amount proportional to the increase in pressure. This will displace the relay downward with respect to the operating piston and consequently a passage will be opened from the space under the piston to the space above, through the ports "Y" and "Z", thus permitting the compression force of the spring "19" to push the piston downward. This movement of the piston, being transmitted directly to the steam chest valve, partly closes the latter thus checking the speed increase. As the speed stops increasing the relay in turn stops in a new position and the operating piston (still moving) catches up with the relay and restores the neutral relative position. This closes the ports "Y" and "Z" to restore equilibrium at the new valve position.

If the speed drops a similar cycle of events takes place in the opposite direction. Upward movement of the relay, caused by the tension in spring "8" overcoming the reduced governing oil pressure, connects the ports "Y" and "X" thus admitting operating oil pressure under the operating piston "12" and causing the latter to move upward thus opening the steam chest valve. As the speed decrease is checked the equilibrium is restored in the same manner as described above.

It should be noted that, since the lap of the relay and piston ports is very small and as the mechanism is substantially frictionless, the operating piston follows movements of the relay so closely that they would appear to act as one piece. Hence the mechanism is immediately responsive to even minute changes in governing oil pressure.

The relay spring "8" is secured to the spring seats "7" and "18". The seat "7" is screwed on and pinned to a bolt "9" which carries a spherical seat nut "6". This nut bears against the bottom of the relay "10" which is consequently free to align itself freely in the bore of the piston "12".

The upper spring seat "18" is screwed onto the long cap screw "15" which is made accessible from without by removing the cover "13". Therefore the tension of the relay spring can be adjusted by screwing the screw "15" into or out of the spring seat "18". The latter is prevented from rotating by the guide stud "17" which extends into a hole in the cylinder cover "14".

In cases where no auxiliary oil pump is available, there will not be oil pressure for the operation of the mechanism until the turbine can be brought up to a speed sufficient for it to furnish its own oil supply. Hence since the servo-motor springs act in the closing direction, manual means must be provided for opening the steam chest valve so that the unit can be brought from rest up to the speed at which the oil pump becomes effective.

This is done by providing a cam lifter actuated by a handle as shown in section "A-A" of Fig. 1. The cam operates under the bushing "1" to lift the steam chest valve by means of the coupling "1", "2" and "4". When the handle is raised to 30° above the horizontal position the cam pushes the coupling upward, opening the valve, and the spring pressure acting on the cam will hold it in this position until the speed comes up to the point at which the oil pressure under the operating piston takes over the load, when the handle will drop of its own weight, returning the cam to the off position.

Figure 1

Item Number	Name
1	Bushing (Retainer)
2	Valve Stem Collar
3	Oil Guard Sleeve
4	Coupling Head (Relay Extension)
5	Operating Cylinder
6	Spherical Seat Nut
7	Relay Spring Seat (Lower)
8	Relay Spring
9	Relay and Spring Seat Connecting Screw
10	Relay
11	Operating Piston Ring
12	Operating Piston
13	Relay Adjusting Screw Cover
14	Operating Cylinder Cover
15	Relay Adjusting Screw
16	Operating Piston Seal Ring
17	Relay Spring Seat (upper) Guide Pin
18	Relay Spring Seat (upper)
19	Operating Piston Spring
20	Governor Valve Operating Stem

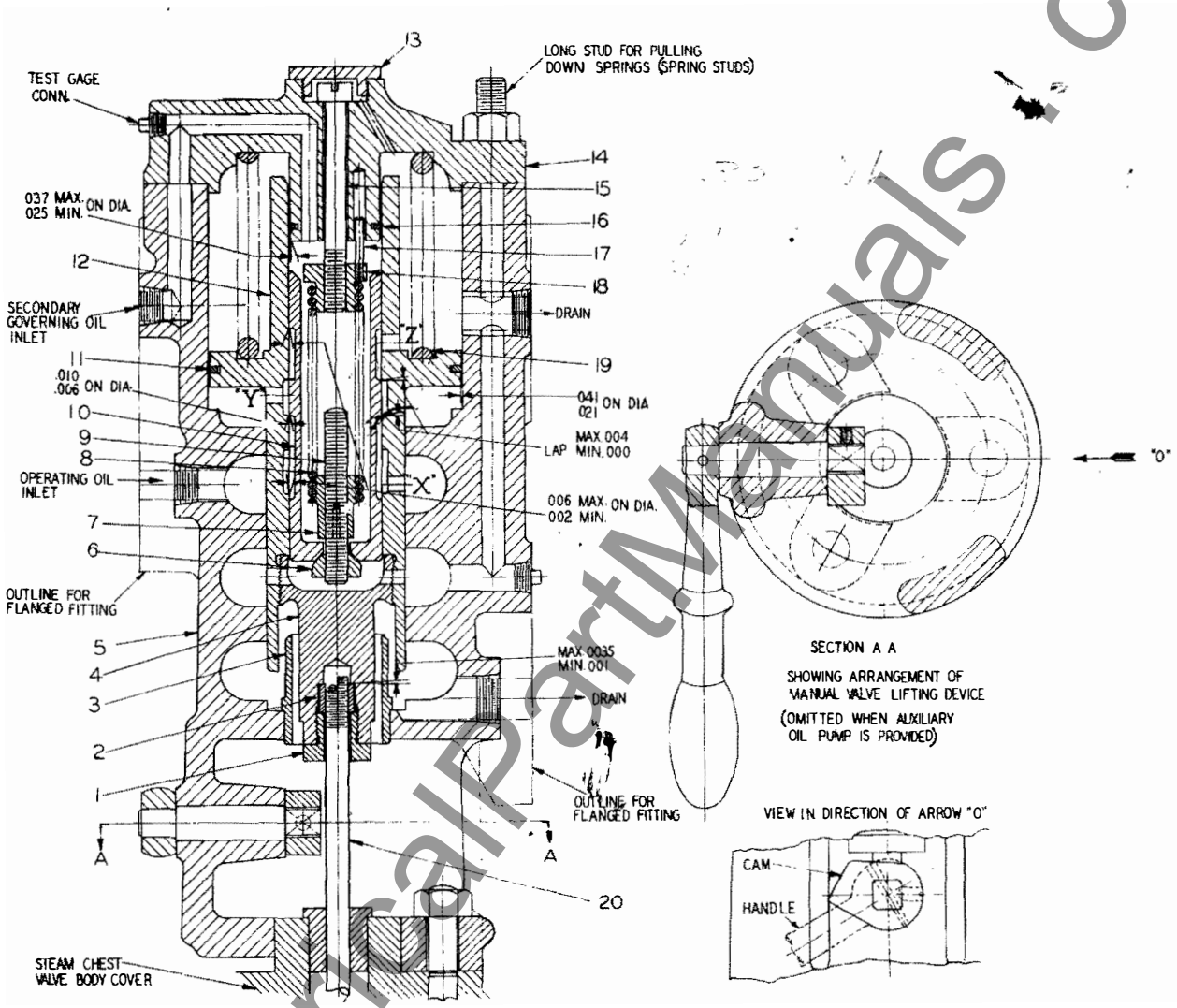

Figure 1

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