Auxiliary Oil Pump

Figure 1 shows the turbine driven, centrifugal type auxiliary pump which is used to supply oil (or any other fluid used for lubrication or valve operation) to the system during the starting and stopping periods when the pressure delivered by the main pump is too low for the requirements of the turbine. It will also start automatically at any time when the main turbine is running, if the oil pressure in the system drops below the predetermined point for which the regulator is set.

The unit, as shown in the illustration, is designed for mounting on the oil reservoir so that the pump impeller is always below the minimum oil level. This arrangement insures a positive suction head and eliminates the necessity of priming the pump.

The pump impeller is keyed on the lower end of the shaft "16" and further secured by the nut "42". Leakage from the discharge side back to the suction is limited to a minimum by labyrinth seals machined on the impeller hubs so as to form close clearances with the body "10" and the cover liner "5". The sheet metal screen "1" is used to protect the impeller against debris.

The pump is driven by a small impulse turbine having two rows of rotating blades. The rotor disc "28" is keyed to the upper end of the shaft by the key "29" and further secured by the nut "30". The rotating blades "26" and "27" are carried in grooves cut in the periphery of the disc and the stationary or reversing blades "38" are held in grooves in the blade holder "37", which in turn is bolted to the casing "19". Steam leakage from the turbine casing along the shaft is limited to a minimum by the gland packing "23" which is of the conventional carbon ring type. Any steam or water that does leak past the packing is thrown outward by the thrower "39" and is removed by means of a drain which discharges to atmosphere.

The entire rotating element is carried by a thrust bearing and two shaft bearings. The thrust bearing consists of the collar "8", which is pinned to the shaft, running against the babbitt-faced ring "7". The two shaft bearings are of the straight, babbitt lined type. The upper one "17" has a split shell, while the lower one is a plain sleeve type. The upper bearing is lubricated by oil from the main turbine bearing oil supply line. The lower bearing and the thrust bearing are lubricated by oil, supplied through drilled passages, from the pump discharge chamber.

The steam flow to the turbine, and hence the speed of the pump is controlled automatically by a separate regulator (or governor). This regulator is actuated by oil pressure from the bearing oil supply line. A steam by-pass around the regulator is provided so the pump can be operated in cases of emergency if the regulator fails to function.

The turbine exhaust steam should be led to a point at atmospheric pressure and the piping arranged so the exhaust pressure at the turbine will not in any case exceed 5 lbs. gauge. Both the steam inlet and the exhaust pipe lines should be drained continuously to eliminate any accumulation of water. This is of utmost importance in order to insure quick starting of the pump in case of an emergency. The elimination of water in the inlet steam will also greatly prolong the life of the pump regulator valve, turbine nozzles, etc.

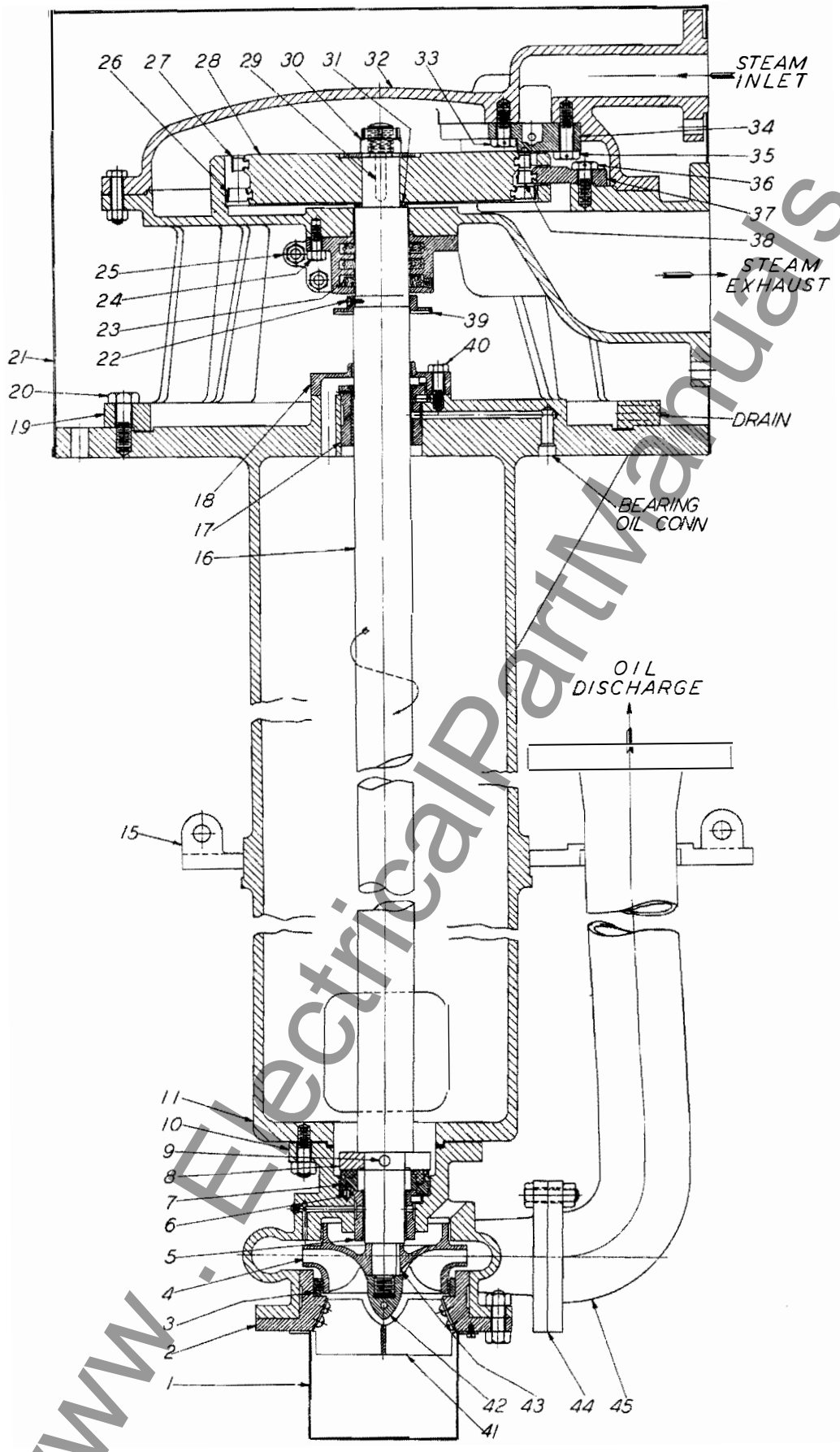

FIGURE 1.

The following list has been compiled for convenience in ordering spare and renewal parts by item number and name, together with the serial number of the turbine.

Item No.		Name
1	-	Pump Impeller Screen
2	-	Pump Impeller Cover
3	-	Pump Impeller Cover Liner
4	-	Pump Impeller
5	-	Pump Shaft Bearing (lower)
6	-	Pump Thrust Bearing Disc Pin
7	-	Pump Thrust Bearing Disc
8	-	Pump Thrust Bearing Collar
9	-	Pump Thrust Bearing Collar Pin
10	-	Pump Body
11	-	Pump Distance Piece
15	-	Pump Reservoir Cover and Support (in halves)
16	-	Turbine and Pump Shaft
17	-	Turbine Shaft Bearing (upper) (in halves)
18	-	Turbine Shaft Bearing Oil Guard
19	-	Turbine Exhaust Casing
20	-	Turbine Exhaust Casing Tap Bolt
21	-	Turbine Casing Lagging
22	-	Turbine Shaft Thrower Screw
23	-	Turbine Shaft Gland Packing (complete)
24	-	Turbine Shaft Gland Case Tap Bolt
25	-	Turbine Shaft Gland Case (complete)
26	-	Turbine Blades (second rotating row)
27	-	Turbine Blades (first rotating row)
28	-	Turbine Rotor
29	-	Turbine Rotor Key
30	-	Turbine Rotor Nut
31	-	Turbine Rotor Spacer
32	-	Turbine Casing
33	-	Turbine Nozzle Block Tap Bolt
34	-	Turbine Nozzle Block
35	-	Turbine Nozzle Block Tap Bolt
36	-	Turbine Stationary Blade Holder Tap Bolt
37	-	Turbine Stationary Blade Holder
38	-	Turbine Stationary Blade
39	-	Turbine Shaft Thrower
40	-	Turbine Shaft Bearing Oil Guard Tap Bolt
41	-	Pump Impeller Suction Guide
42	-	Pump Impeller Nut
43	-	Pump Impeller Key
44	-	Gasket
45	-	Pump Discharge Pipe