ROTOR TURNING GEAR

This turning gear is used to rotate the rotor at a very low speed (about 3 RPM.) while the turbine is shut down, so as to reduce to a minimum the distortion of the rotor due to uneven cooling of the turbine parts. Its use will vary, depending on the size and type of turbine and the local operating conditions. In general, it is recommended that the turning gear be used continuously during shutdown periods. If the shutdown period is to be of long duration, the turning gear should be operated for a sufficient period to prevent distortion, before the rotor is brought to rest.

If for any reason the turning gear stops while the turbine is cooling, the rotor should be allowed to stand and the turbine cooled without rotation unless the turning gear can be restored to normal operation within ten minutes. Obviously, following such an occasion, the entire unit must be allowed to cool to quite a low temperature before it can be started again.

In every case the turning gear should be operated for a short time before starting the turbine by steam. The best procedure for any particular unit can be determined only by actual operating experience and the shaft deflection shown by the truth indicators adjacent to each gland.

Figure 1 shows a sectional assembly of this mechanism. It is mounted on the coupling cover and drives the rotor by engaging gear teeth which are cut in the coupling spacer ring. Its principal parts are a driving motor, a train of spur gears to reduce the speed and a hand lever with the necessary linkage for engaging and disengaging the gear.

Referring to the figure, the motor "24" drives an idler gear "12", through the pinion "33". The idler "12" meshes with the gear "6". Rotation of gear "6" is transmitted by the integral shaft and pinion "2" to the gear "43" and pinion "40" which in turn drives the gear "49". Gear "49" in turn, mounted on the integral shaft and pinion "9", transmits the rotation through the idler "46" to the pinion "27" which engages teeth cut in the coupling spacer ring.

Each pinion shaft bushing is lubricated by oil under pressure. This oil is supplied from the main bearing system and is led through machined and drilled passages as shown in "Section C-C" and "Section F-F". The discharge from the shaft bushings is directed into the gear wheels to lubricate the gear teeth.

The 5th reduction pinion "27" is carried by the two arms "26" and "29" which are, in turn, fulcrumed on the shaft "10". The inner ends of the arms "26" and "29" are connected by the rod "54" to the hand lever "36". Therefore, raising the lever "36" moves the pinion "27" into mesh with the coupling teeth, and lowering the lever "36" moves the pinion out of mesh with the coupling teeth. Due to the direction of rotation and the position of the pinion "27" relative to the fulcrum point of the arms "26" and "29", as long as the pinion is exerting torque on the coupling its torque holds it in mesh. The two pinion shaft supports "61" limit its movement toward the coupling and thus limit the depth to which the teeth can mesh. If the speed of the turbine rotor increases sufficiently to drive the turning gear, the torque exerted by the coupling teeth automatically throws the pinion "27" out of mesh and thus disengages the mechanism.

To Engage the Turning Gear

1. Do not, under any circumstances, attempt to engage the turning gear while the turbine rotor is in motion. Wait until the turbine rotor stops.

2. Be sure that the auxiliary oil pump is running and that normal oil pressure is established on the turbine and generator main bearings.
3. Turn on the oil to the turning gear.
4. The hand lever "36" should be latched in its lowest position.
5. Start the motor, just enough to give it a spin.
6. Just before the motor stops, raise the hand lever "36", which brings the pinion "27" into mesh with the coupling teeth. Latch the lever "36" in its highest position.
7. Start the motor.

To Disengage the Turning Gear

(a) When the turbine is to remain shut down:

1. Stop the motor. It is impossible to disengage the turning gear by hand while the motor is running.
2. Move the hand lever "36" downward which moves the pinion "27" out of mesh. Latch the lever in its lowest position.
3. Shut off the oil to the turning gear and stop the auxiliary oil pump.

(b) When the turbine is being started up:

1. As the speed of the turbine increases, the turning gear will be disengaged automatically.
2. See that the lever "36" is latched in its lowest position.
3. Stop the motor.
4. Shut off the oil to the turning gear only.

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 of Part
1	Dowel
2	Shaft and Pinion (2nd Red)
3	Bushing
4	Cover
5	Key
6	Gear (1st Red)
7	Set Screw
8	Bushing
9	Shaft and Pinion (4th Red)
10	Shaft (Idler Gear)
11	Dowel
12	Gear (Idler)
13	End Plate
14	Shaft (Idler Gear)
15	Bushing
16	Pin
17	Pin
18	Knob
19	Pin
20	Latch Pin
21	Spring
22	Cover
23	Taper Pin
24	Motor
25	Gasket
26	Pinion Shaft Arm
27	Pinion (5th Red)
28	Bushing
29	Pinion Shaft Arm
30	Washer
31	Shaft
32	Motor Key
33	Pinion (1st Red)
34	Pinion Cover
35	Felt Oil Retainer
36	Starting Lever
37	Bushing
38	Key
39	Bushing
40	Shaft and Pinion (3rd Red)
41	Spacer
42	Key
43	Gear (2nd Red)
44	Gasket
45	Bushing
46	Gear (Idler)
47	Lock Plate
48	Cover
49	Gear (3rd Red)
50	Taper Dowel
51	Crosshead
52	Bracket
53	Packing
54	Connecting Rod
55	Taper Dowel
56	Taper Bolt
57	Taper Pin
58	Housing Cover (RH)
59	Equalizing Bar
60	Housing Base (RH)
61	Pinion Shaft Support
62	Dowel
63	Lockwasher
64	Spacer
65	Spacer
66	Bolt

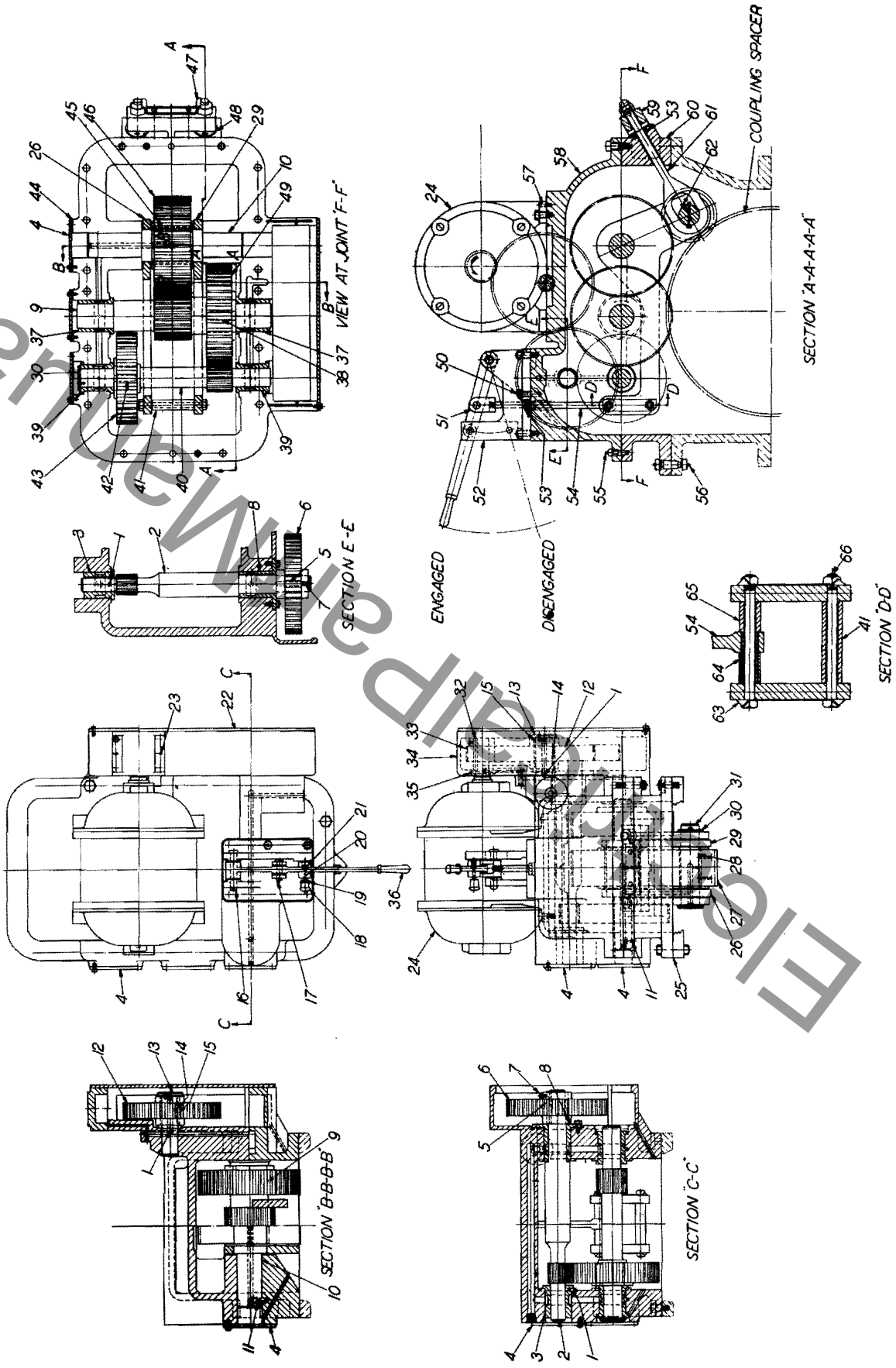

Figure 1