Thrust Bearing

The thrust bearing shown in Figure 1 is of the Kingsbury leveling block type, which automatically distributes the load equally among the various shoes. These shoes are supported on the leveling blocks "16", "17", "18", and "19", which by means of their rocking motion, allow the shoes to take a position so that the babbitted faces are all in the same vertical plane. Consequently, each shoe takes an equal share of the load. This construction eliminates the necessity of having all the shoes of exactly the same thickness. By a cumulative shifting of the leveling blocks the thrust shoe load is also uniformly distributed in case the shaft carrying the collar is not exactly parallel to the bore of the housing.

The thrust of the rotor is transmitted to the shoes by means of a steel collar which is machined integrally with the stub shaft which is bolted to the end of the rotor shaft. The main illustration, Section C-C, shows a full complement of shoes on each side of the collar to carry the thrust in either direction. On some machines, only two shoes are used on the side of the collar carrying the lighter thrust. In such cases, the two shoes are assembled on a base ring as shown in the "Part Section for Two Shoe Assembly" at the right of Figure 1.

Referring to Section C-C the shoes and leveling blocks are carried in the bearing cage consisting of items "1", "2", "8" and "10". These parts are bolted together solidly to form the completed cage, which, in turn, is held in a horizontal direction by means of the thrust bearing adjusting mechanism (described in a separate leaflet).

The axial movement of the cage is limited by the stops, consisting of slides "26", wedges "27" and shims "28", to maintain a predetermined clearance in the Running and the start and stop positions. The stop wedges can be moved inward or outward by means of the adjusting screws "25", thereby decreasing or increasing the amount of axial movement of the cage in either direction. One full turn of the adjusting screw changes the axial clearances within the turbine cylinder 10 mils (.010 inch). When making an adjustment the adjusting screws on both sides of the cage must be changed the same amount. The covers over these adjusting screws can be removed and adjustments made while the unit is in operation. This construction of adjustable stops is used merely to facilitate the work of dismantling, assembly, grinding of axial seals, etc., during installation and repair periods. In normal operation these adjusting screws "25" must not be moved under any circumstances.

In connection with maintenance work, it is important to note that on some machines it is necessary to move the rotor toward the exhaust end, beyond the start and stop position, before raising the cylinder cover or the rotor. When such additional movement is necessary, the inner stops (that is those on the gland side of the cage lugs) must be backed out and the cage moved toward the coupling end, the required amount as given on the rotor clearance drawing.

Dismantling and Assembling

The entire thrust bearing can be dismantled without removing the rotor or stub shaft. By removing the dowel screws "3" which hold the upper and lower halves of the cage together, both halves can be removed. The

shoes are loosely fastened in the cage halves and will not drop out when these parts are lifted. However, when reassembling, the shoes and leveling blocks which are adjacent to the horizontal joint should be packed with a heavy grease in order to prevent these blocks from falling out of position. Otherwise there is danger of the blocks and shoes locking so that there is no flexibility, with resulting possible overloading of two or more shoes.

Adjustments

The total axial clearance in this bearing should be between 13 and 17 mils (.013 and .017 inch). To check this, the bearing cage should first be completely assembled. The liners "9" should then be removed and the vertical joint bolts pulled up evenly. The thrust shoes will then be clamped against the collar with a fair degree of tightness. The space left vacant by the liners "9" should be measured accurately with feeler gauges. This reading, plus the clearance of 13 to 17 mils, is the thickness of liners which should be inserted in order to obtain the correct running clearance. After assembling in this manner, and with the cage locked in position (by means of the stops "27") so that no lost motion occurs, the clearance should be checked by rolling the rotor and moving it from one extreme axial position to the other, and measuring the end travel with a dial type indicator.

The stop wedges "27" which determine the Running and start and stop positions of the thrust bearing cage should be adjusted as follows:-

a. Set the rotor in its correct running position to give the blade and labyrinth seal clearances specified on the rotor clearance drawing.

b. Then adjust the outer stop screws "25" to bring the wedges "27" against the cage lugs.

c. Screw the inner stop screws inward until the wedges are against the cage lugs. Then back them out to give the end travel specified on the rotor clearance drawing. One turn of the adjusting screw changes the position of the cage 10 mils. If the screws do not give the desired setting, adjust the liners "28" accordingly.

d. Move the cage, by means of the adjusting mechanism handwheel, to make sure that the travel between the running and start and stop positions is correct.

When checking the axial position of the thrust bearing cage, it is important to note that with the blade clearances as specified on the rotor clearance drawing, the thrust cage should be set so that all the clearance between the thrust collar and babbitted shoes is on the side of the collar adjacent to the gland.

This means:- that within the limits of the thrust bearing clearance, the rotor can float toward the coupling end but cannot float toward the thrust end.

Lubrication

The bearing is flooded with oil under pressure at all times. This oil is supplied directly from the main bearing supply line. The passages and directions of flow are shown in the Figure by arrows. As the thrust collar rotates with reference to the shoes the film of oil between each shoe and the loaded collar will tend to take a wedge like shape with the thick

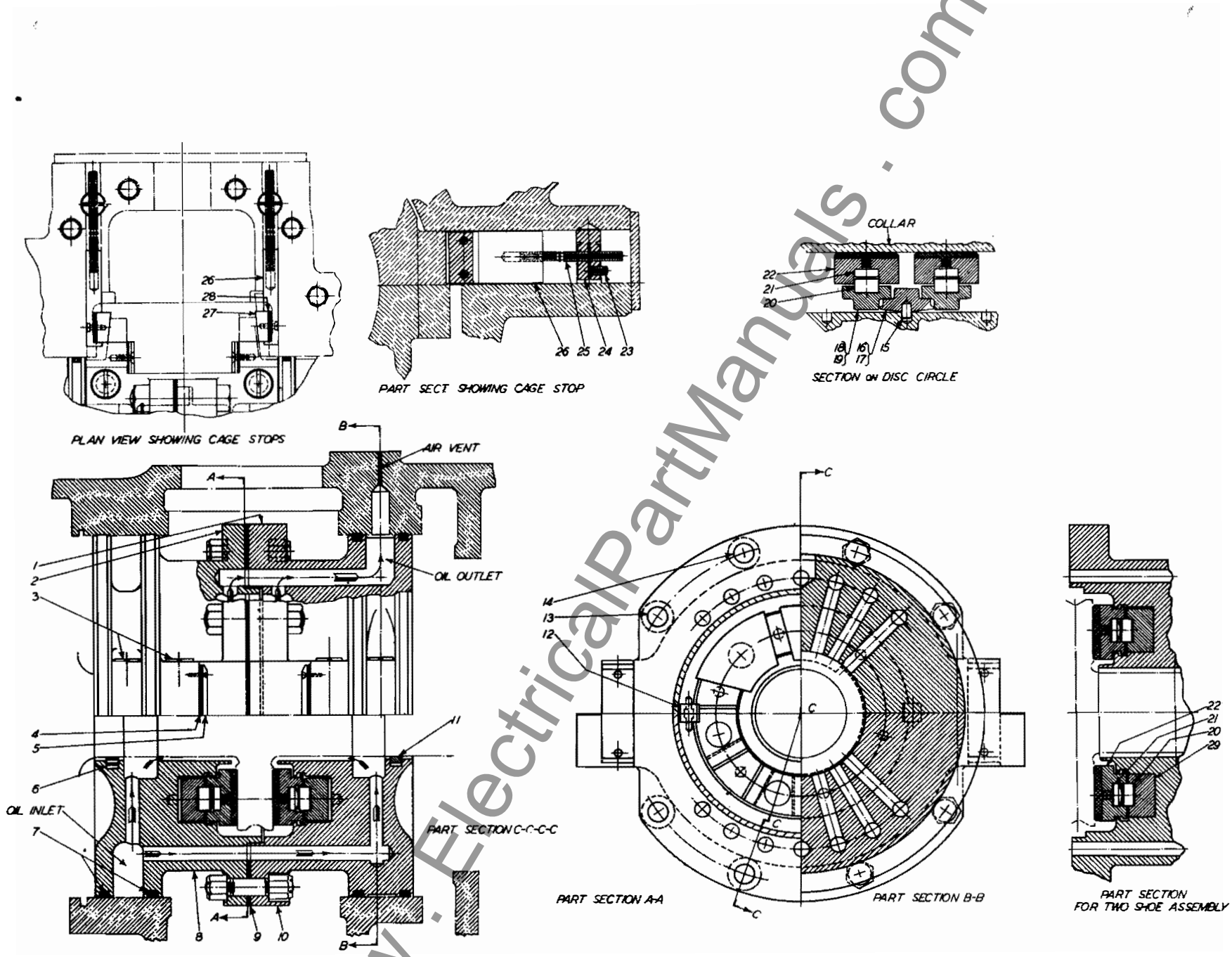

Fig. 1 - Thrust Bearing Assembly

side of the wedge on the forward (or entering) edge of the shoes. Thus the oil is carried between the bearing surfaces by the motion of the collar and assures proper lubrication of these surfaces. The amount of oil flowing through this bearing is determined by the size of an orifice installed in the oil discharge line.

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	Cage (Outer End Upper Half)
2	Cage (Inner End Upper Half)
3	Cage Screws (Horizontal Joint)
4	Adjusting Mechanism Yoke Cam Shoe Liners
5	Adjusting Mechanism Yoke Cam Shoe Liner Retainer
6	Cage Seal Ring Complete (Inner)
7	Cage Packing Ring
8	Cage (Inner End Lower Half)
9	Cage Adjusting Liners
10	Cage (Outer End Lower Half)
11	Cage Seal Ring Complete (Outer)
12	Leveling Block Stop Key
13	Cage Stud Bolt (Fitted) (Vertical Joint)
14	Cage Stud Bolt (Vertical Joint)
15	Leveling Block Pin
16	Leveling Block (Outer)
17	Leveling Block (Outer) (Slotted for Stop Key)
18	Leveling Block (Inner)
19	Leveling Block (Inner) (Slotted for Stop Key)
20	Shoe Disc Seat
21	Shoe Disc
22	Shoe
23	Cage Stop Dowel Lock Screw
24	Cage Stop Dowel
25	Cage Stop Adjusting Screw
26	Cage Stop Slide
27	Cage Stop Wedge
28	Cage Stop Wedge Liners
29	Segment Base Ring (For 2-Shoe Assembly)

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