

LUBRICATING OIL TEMPERATURE FOR MARINE TURBINES

by

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It has been the practice with marine turbines to limit the lubricating oil temperature at the outlet from the cooler to about 90°F. and even lower temperatures are often maintained when the sea water temperature is very much reduced.

Recent investigations into the characteristics of double reduction gearing have emphasised the desirability of maintaining higher oil temperatures than the above with the grade of oil at present in use. This change gives a two-fold advantage. Firstly, the wastage of developed turbine power is appreciably reduced. It is estimated that an increase of oil supply temperature from 90°F. to 120°F. reduces the power lost in turbines and gearing from :—

2.69 per cent. to 2.23 per cent. at full power	}	in a current single reduction set
5.3 per cent. to 4.4 per cent. at 20 knots		
3.25 per cent. to 2.58 per cent. at full power	}	in a new design with double reduction gearing
6.46 per cent. to 5.13 per cent. at 20 knots		

Secondly, the efficiency of deaeration of the oil in the drain tank is considerably improved with the higher temperatures. The capacity of the drain tanks fitted in H.M. ships is such that the oil passes from the inlet in the tank to the pump suction in a comparatively short time. During its stay in the drain tank air bubbles entrained in the oil rise to the surface. The speed at which they do so depends on the viscosity of the oil and the bubble size, large bubbles rising more quickly than small ones. In a low viscosity oil small bubbles join together into large ones. In a drain tank, therefore, other things being equal, the higher temperature will lead to a reduction both in the quantity of air and in the size of bubble which remains entrained in the oil reaching the pump suction. This factor is of less importance with displacement type pumps than with centrifugal, since the former is not subject to complete failure by air locking, although air in quantity does cause an appreciable reduction in designed output.

Investigations are in hand with a view to amending the instructions issued by A.F.O. 5531/45 and recommending that during normal operation the temperature of the oil at the inlet to bearings and gearing sprayers should be maintained between 120°F. and 140°F. and the outlet oil temperature between 140°F. and 160°F. The temperature rise of oil passing through any bearing under any operating condition should not exceed 50°F., nor should the final outgoing temperature of the oil exceed 180°F. To obviate the necessity for continuous adjustment by watchkeepers, new designs with double reduction gearing are being fitted with a thermostatically operated oil bypass valve to the oil cooler.

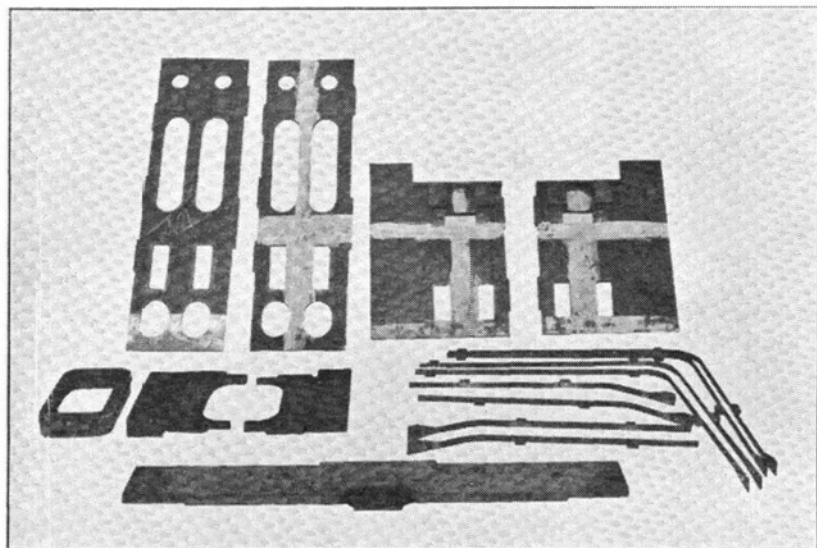


FIG. 1.—SOME OF THE PARTS PREPARED FOR ASSEMBLY

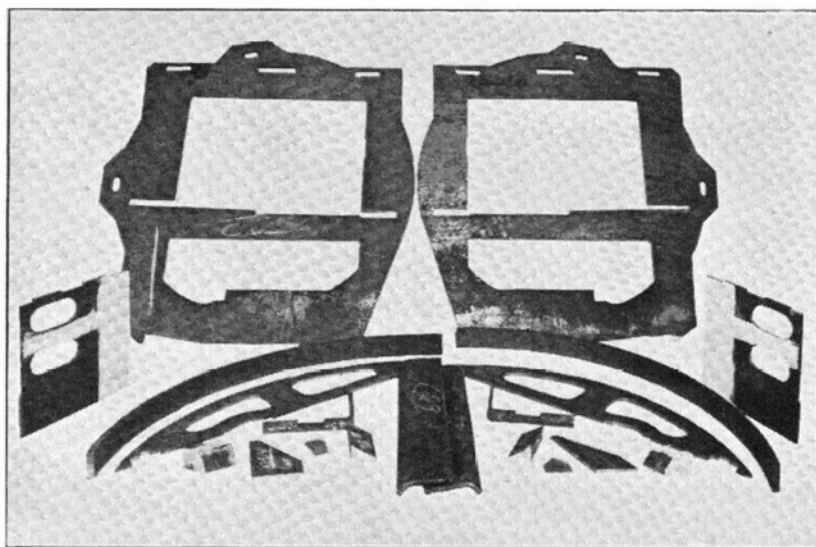


FIG. 2.—SOME OF THE PARTS PREPARED FOR ASSEMBLY